DRAFT ENVIRONMENTAL IMPACT REPORT

444 MARKET STREET PROJECT SAN FRANCISCO, CALIFORNIA

EE 74.253

Dept. of

San Francisco City Planning Commission
January 24, 1975

DEPARTMENT OF CITY PLANNING 100 LARKIN STREET · SAN FRANCISCO, CALIFORNIA 94102

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SAN FRANCISCO CITY PLANNING COMMISSION
Dr. Selina Bendix, Environmental Review Officer,
City Planning Department
January 24, 1975

Formulated By

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With

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[1] Source of illustrations and tables in Appendix A is Sedway/Cooke.

2 Source: Joseph Coons

3 Source of illustrations in Appendix C is Environmental Impact Planning Corporation.

[4] Source of tables in Appendix D is Buonaccorsi & Associates

SUMMARY

A. PROJECT DESCRIPTION

The Continental Development Corporation proposes an office/retail project on five parcels of Assessor's Block 266 which is bounded by Pine, Front, Market and Battery Streets. Three office/retail buildings on this 0.93-acre site in the downtown office district would be razed -- 2-story, 5-story and 6-story buildings with total gross floor area of 168,000 square feet. An existing 3-story building would be retained. It now contains a 221-space garage with auxiliary automotive services and two small retail shops.

One new building would be constructed. It would include two major elements: 1) a 38-story office tower, with first floor retail uses, at the northwest corner of Front and Market Streets, and 2) a 2-story retail structure, attached to the west side of the office tower.

The 768,000 square feet (gross) in the project would be serviced by 209 existing off-street parking spaces in the garage and by four off-street loading spaces proposed to be located in the garage. Approximately 2000 persons would be employed on the site. Construction is proposed to begin in January 1975, or as soon thereafter as possible, and to be completed in April 1977.

B. IMPACTS OF PROPOSED PROJECT [1]

Planning, Acquisition and Construction Stages of Project

- o High-rise would exceed, by about $2\frac{1}{2}$ feet, the 170-foot maximum building length permitted by the City Planning Code. Requires review and approval by Planning Commission.
- o Displacement of an estimated 225-250 business operations, employing about 335 persons.
- o Significantly increased noise during construction -- greatest during the first four months involving demolition, excavation and pile driving operations. [2]
- o Increased vehicular congestion on Front Street due to closing of parking/loading lane throughout the construction period and temporary closing of one additional travel lane as necessary to accommodate construction of a manhole and delivery of heavy materials. [2]
- o Loss in the City's inventory of moderately-priced office and retail space: 136,700 square feet and 24,100 square feet respectively.
- o Approximately 90,000-97,000 man-days of construction time for employees directly on the job site; payroll of approximately ten million dollars for on-site labor.

Operation Stage of the Project

- o Increase from 1,200 to 6,400 nontransit vehicle trips generated by site. Generation of 8,900 person trips by auto. Generally increased vehicular traffic in the vicinity.
- o Increased parking demand generated by site from 230 to 1,010 spaces.
- o Increased competition for existing off-street parking spaces in the blocks near the project which are now deficient in parking. Probable displacement of some existing patrons of project garage by project tenants.

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[1] Only major and moderate adverse and positive impacts are included in this summary. Other factors for which there is either negligible impact or no impact are discussed in Section IV, pages 32-53.

[2] Indicates that the impact might be reduced and that possible mitigation is discussed in Section VI, pages 57-63.

- o Generation of 320-340 nontransit vehicle trips per day for sales, service and freight loading/unloading. Probable increased illegal parking adjacent to site and consequent increased congestion.
- o High velocity southerly winds at pedestrian level on project plaza.
- o Increased off-site winds and discomfort levels at the intersection of Market and Fremont Streets, the intersection of Market and Front Streets, and on Market Street adjacent to the high-rise.
- o Blockage of light and views from the south side of the adjacent 111 Pine Building (111 Pine Street.)
- o Increased congestion on Battery Street caused by: 1) trucks having to back into or out of the garage for the off-street loading spaces; and 2) use of the garage for both off-street parking and loading.
- o Employment of about 2050 persons by office and retail uses in the project.
- o Net increase of approximately $11.3 million in assessed valuations and net increase of approximately $1.4 million annually in City revenues.
- o Compliance with City objectives for location of high density office uses with good access to public transit, increased pedestrian activity on Market Street, and building color.

C. MITIGATION MEASURES PROPOSED TO MINIMIZE IMPACTS OF THE PROJECT

Some of the impacts identified above may be reduced by one or more of the following mitigation measures. Several other mitigation measures, already completed during the project's planning and acquisition stages, are discussed in Section VI, pages 57 - 63.

Planning Stage	o Add walls or other appropriate elements to rooftop terraces of the high-rise to reduce winds on the terraces. o Add an overhang or other appropriate element at the entrance of the high-rise to keep the high speed wind stream well above the project plaza and to reduce turbulence near the high-rise's entrance. o Increase the existing 10'3" headroom clearance to the project garage to permit additional use of the two interior-most off-street loading spaces. o Consider using a trash compactor to reduce the bulk of site-generated solid waste.
Construction Stage	o Stop excavation operations until an evaluation can be made by a qualified person if there is any indication of artifacts of potential archaeological significance. o Strictly comply with the State's Construction Safety Orders and the City's Noise Abatement and Control Ordinance. Assure close coordination with the City's Committee for Utility Liason Construction and Other Projects (CULCOP). o Wet-down on-site debris and clear City streets and sidewalks adjacent to the project of project-generated dirt and debris. o Restore all right-of-way improvements to their original or better condition, including the replacement of trees, if necessary. Temporarily store bricks and light standards of the recently constructed Market Street sidewalk to prevent damage to those materials. o Program delivery of materials to reduce unnecessary backup of delivery trucks and to reduce obstructions to traffic, especially during the peak commuter periods.
Operation Stage	o Assure efficient operation of parking garage during the morning peak period to reduce backup on Battery Street.

II PROJECT DESCRIPTION

A. LOCATION AND BOUNDARIES OF THE PROPOSED PROJECT

Block & Parcels

- o San Francisco Assessor's Block 266 (which is bounded by Pine Street on the north, Front Street on the east, Market Street on the south and Battery Street on the west).
- o Parcels 2, 3, 4, 5 and 7 of Block 266.

Location of the project in the downtown area and an insert detail of Block 266 are shown on Illustration 1, page 6 .

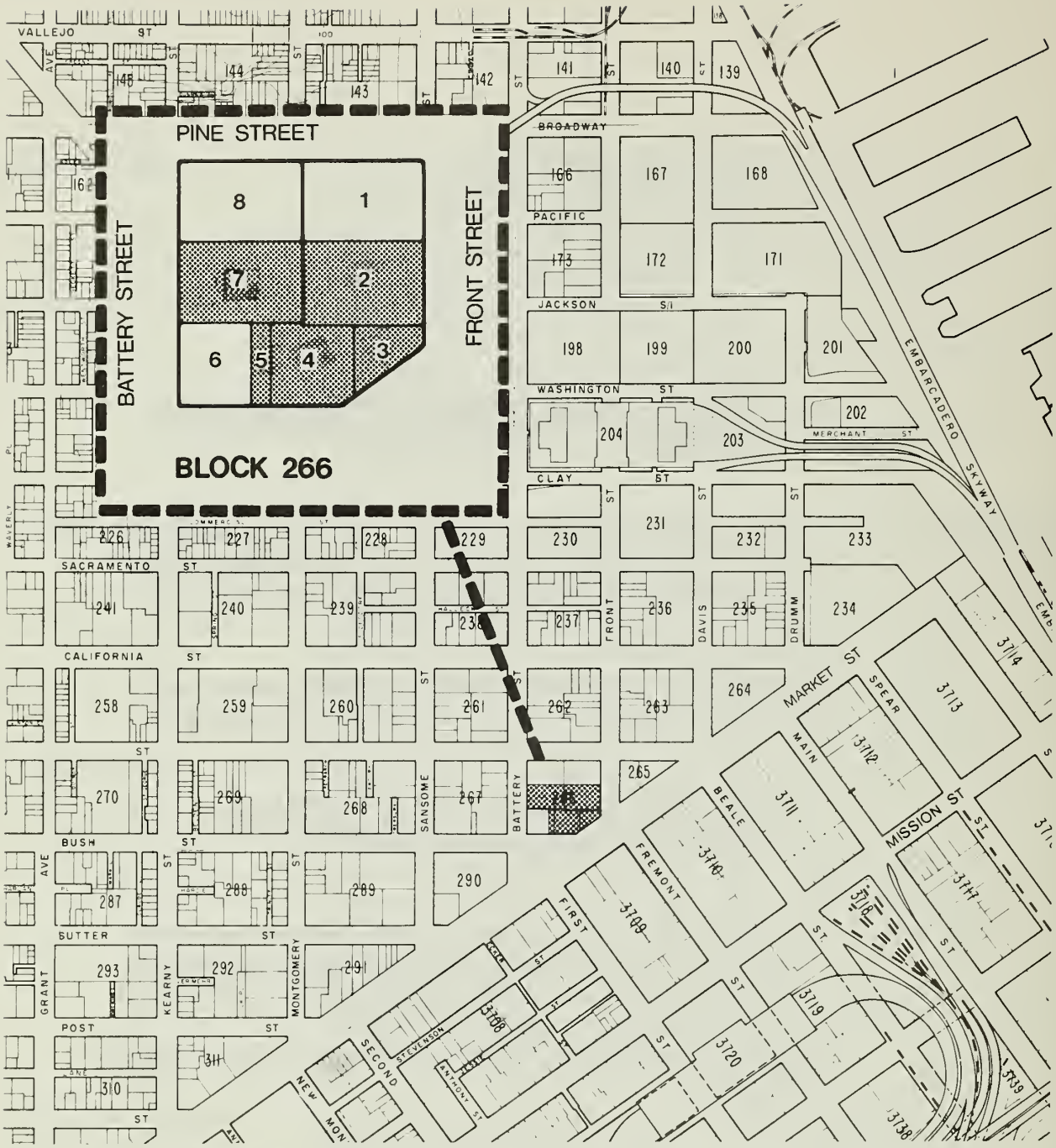
B. OBJECTIVES SOUGHT BY PROJECT SPONSOR (Continental Development Corporation)

- o Develop a new office complex with supplementary retail space on a downtown site that has good location with respect to the City's downtown office district, to access by public transportation and highways.
- o Complement City objectives for the redevelopment of Market Street.
- o Profit.

C. TYPE OF PROJECT

Area & Lot Coverage

The project site has an area of 40,408 square feet. Buildings would cover 89 percent of the site.



SITE LOCATION **Illustration 1**

444 MARKET STREET PROJECT
SAN FRANCISCO, CALIFORNIA

NORTH

General Project Characteristics

Building Relationships, Area & Uses

The site would contain two buildings: 1) a new building consisting of a 38-story high-rise building element, with retail on the first floor, and a new 2-story low-rise retail building element; and 2) an existing 3-story garage. The buildings would be functionally and physically separated from each other, except that there would be a direct service connection between the high-rise's ground floor service area and the garage's off-street loading area, as shown on Illustration 2, page 8 . (Hereafter, for brevity, the three building elements will be called the "high-rise," "low-rise" and "garage").

Total floor area in two buildings would be approximately 786,000 square feet. Gross areas for major uses would be: office, 697,000 square feet; retail, 38,000 square feet; and parking/loading, 51,000 square feet. Minor changes may be made through the on-going design process, but as of December 10, 1974, uses and area in project buildings were proposed as in Table 1 following.

Table 1

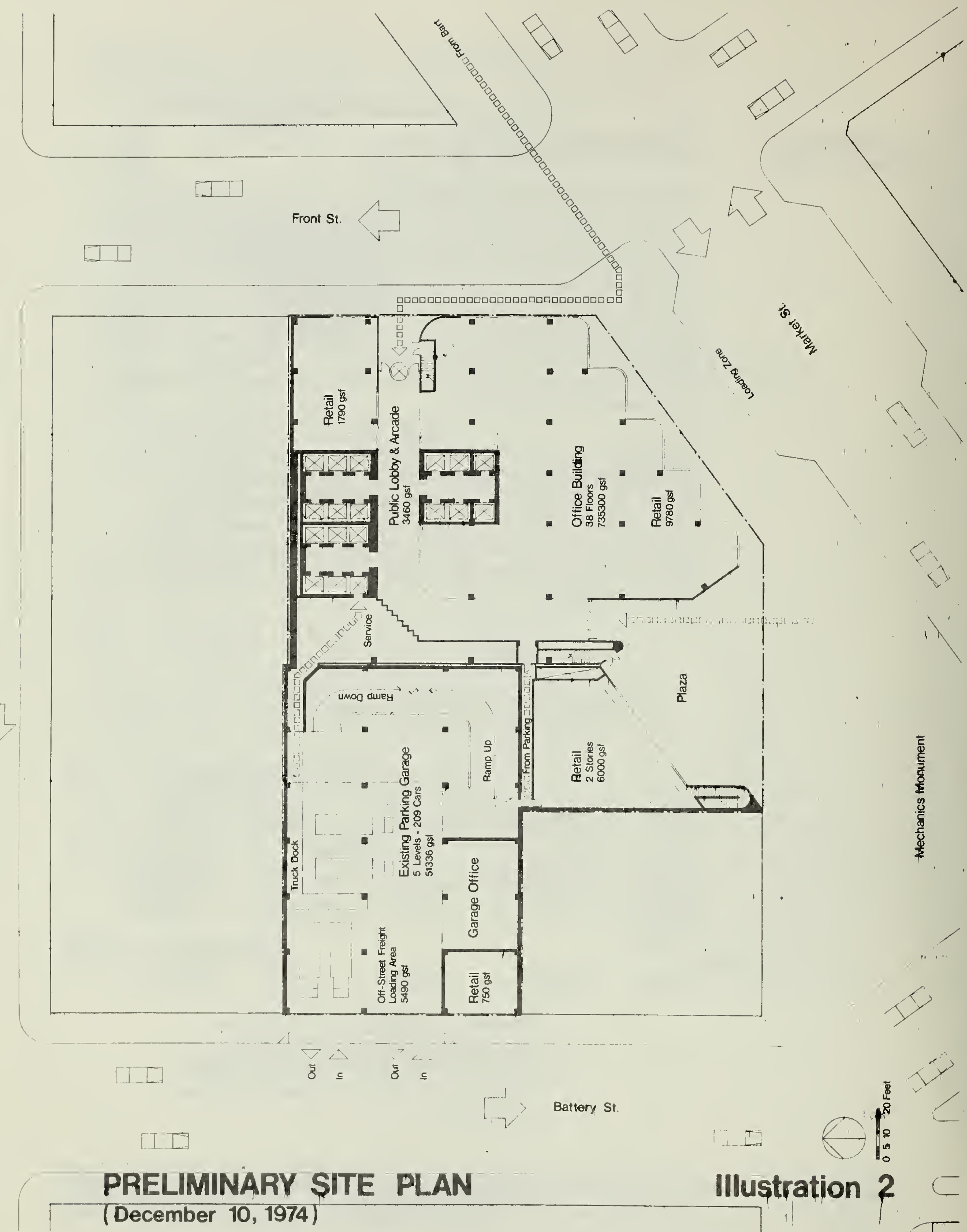
USES AND AREA IN PROJECT BUILDINGS
(As of December 10, 1974)

	Gross Area (Square Feet)			
Use	High-rise	Low-rise	Garage	Total
Office*	696,800	--	--	696,800
Retail	31,600**	6,000	800	38,400
Parking/ Loading	--	--	50,500	50,500
TOTAL	728,400	6,000	51,300	785,700

* Including mechanical and circulation space primarily related to office use.

** Includes 11,600 on first floor and 20,000 for private dining club on one upper floor (see page 11.)

Building relationships, ground floor uses and access are shown on the Preliminary Site Plan, Illustration 2.



PRELIMINARY SITE PLAN
(December 10, 1974)

Illustration 2

Pedestrian Access

Pedestrian access to the high-rise would be from Market Street, through an open landscaped plaza, and from Front Street; to the retail uses in the high-rise, it would be both from street frontages and the public arcade inside the high-rise.

Pedestrian access to the low-rise would be from Market Street through a landscaped open plaza. Direct access from the garage would be provided through a walkway directly connecting the garage to the high-rise and the low-rise.

Vehicular Access, Parking & Loading

Access to the project's 209 off-street parking spaces and four off-street loading spaces, all in the garage, would be from Battery Street. Adjacent to the site, there are three on-street parking/loading spaces in a loading zone cutout on Market Street and four on-street parking/loading spaces on Front Street.

Employment

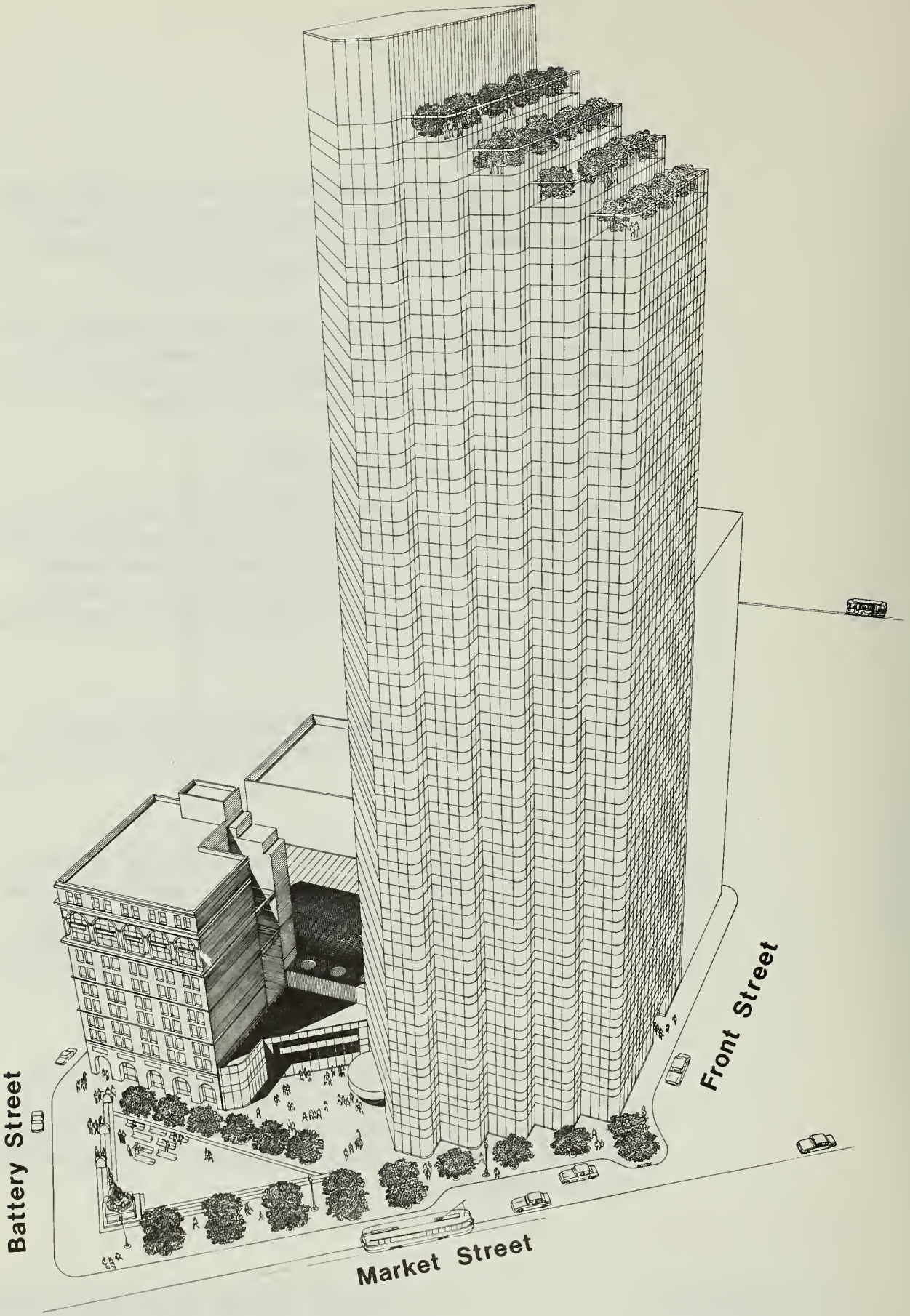
With buildings fully occupied, it is estimated that approximately 2,050 persons would be employed on the site for all uses.

Rental Levels

Rental levels for office and retail space in the high-rise and low-rise are expected to be comparable to those for equivalent new building space in the general area of the project. The general range per square foot, as indicated by the developer, would be $12-$18 for office space and $12-$25 for retail space.

* * * * * *

Illustration 3, page 10, shows a perspective sketch reflecting project design as of December 10, 1974. Continuing minor changes may be anticipated because the project design is still in process. Neither building elevations nor a landscaping plan are now completed.



PERSPECTIVE OF PROJECT
(December 10, 1974)

Illustration 3

Building Characteristics: High-rise Element*

Use

The 38-story high-rise would be primarily for offices, with two exceptions: 1) One upper floor is proposed to be used for a private dining club, although this use is not specifically fixed. 2) In addition to a public lobby and pedestrian arcade, the ground floor would include retail uses -- one of which probably would be a small restaurant or coffee shop; another would be a candy store. An observation deck, open to the public, would be located on an upper floor, but below the penthouse levels for mechanical equipment (floors 36-38).

As of December 10, 1974 the developer knew only two prospective tenants of the project. The Imperial Savings and Loan Association and See's Candies, both of which occupied existing buildings on the site, would be in the high-rise.

Illustration 4, page 12, shows the proposed floor plan for offices on floors 2-15 of the high-rise. The plan for office floors 16 up to floor 35 will vary in accordance with changes in elevator banks and decreasing floor area.

Height and Bulk

Height of the high-rise would be 537 feet, from grade level to the top of the parapet on the roof of the building. The building would be 456 feet high at the first landscaped terrace on the 32nd floor.

Building bulk would be approximately 2800 square feet less than the 697,800 square feet allowable by City regulations.

Design

The high-rise design concept would involve a "stepped-back" plan featuring open landscaped terraces on the Front Street (east side) of floors 32,33,34 and 35. The south facade would parallel the diagonal of Market Street and the diagonal of the west facade would line up with the west facade of the One

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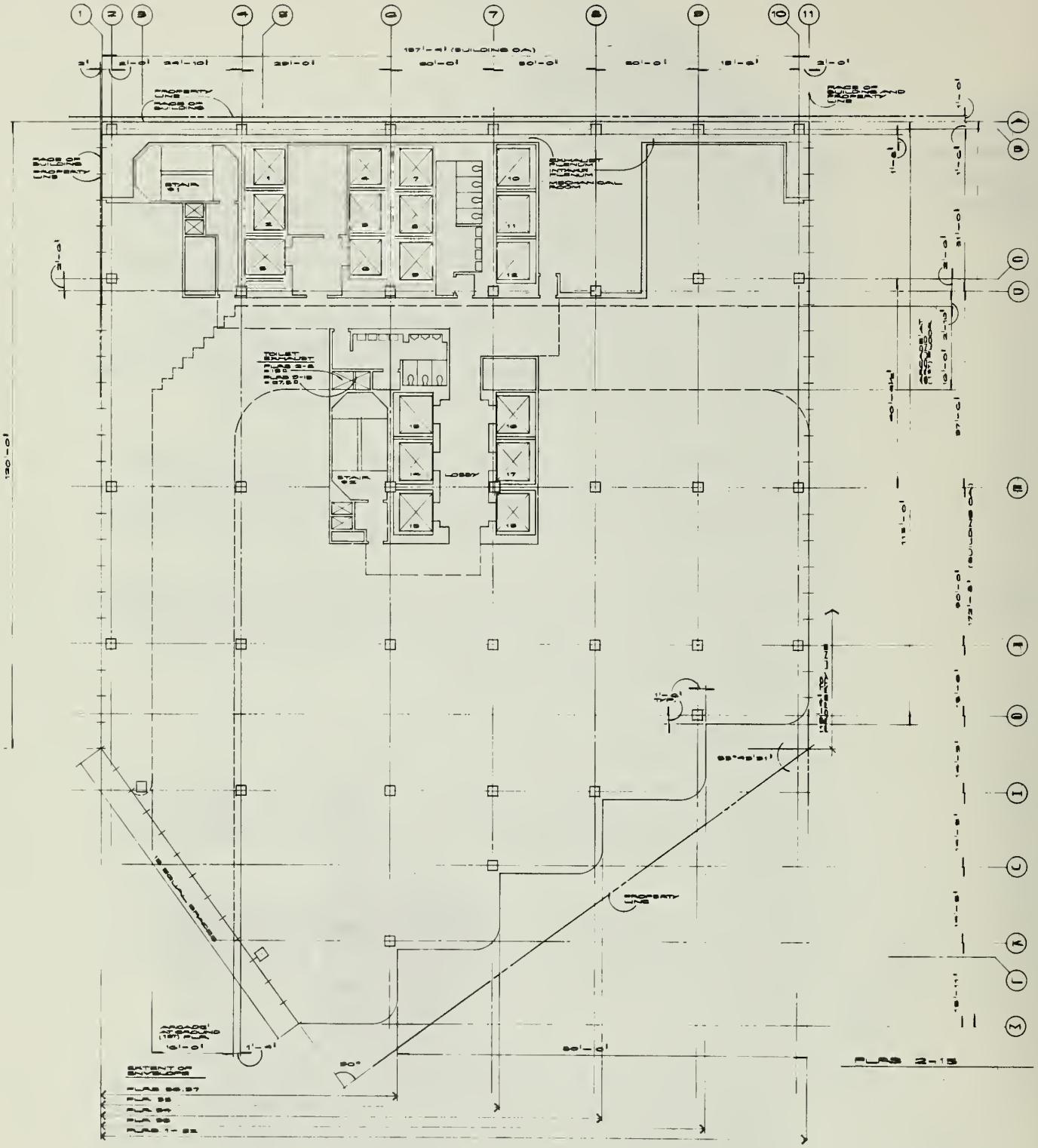
* See "Legal, Policy, Institutional Constraints," page 18.



HIGHRISE: TYPICAL PLAN, FLOORS 2–15
(December 10, 1974)

Illustration 4

Metropolitan Plaza Building which is directly across Market Street. The building would be set back about two feet from the Market Street property line.

Windows on the east, south and west facades would permit views in those directions. The north side of the building, which is one foot from the adjacent 111 Pine Building, would have no windows.

A high proportion of "view" offices would be permitted due 1) to the undulating facade (which has more window area than a flat facade) on the Market Street frontage, and 2) to placement of the elevator core on the north side of the building.

The building would present a varied profile when viewed from different directions.

Exterior walls would be "thin wall" construction using aluminum and glass, with the aluminum clear or a light color. Glass (curved on the Market St. facade) would be clear on the first floor, and tinted solar grey on all other floors. *

Building Characteristics: Low-rise Element

The low-rise, facing on the open landscaped plaza, would be two-stories and a maximum of forty feet high. (See Illustration 2, page 8 .) It would be for retail uses only. Design is not yet complete, but the developer states that the building will complement the high-rise in its direct relationship to the plaza and its use of finish materials.

Building Characteristics: Garage

The existing garage has five levels of parking. Because of restricted maneuvering room, limited ramps and no pedestrian stairs or ramps, parking has been and must continue to be serviced by attendants -- generally a slower procedure than self-parking.

First floor ancillary services now include a shop repair area and a lubrication/oil area. Avis Car Rental has an office with pedestrian access from Battery Street; it leases garage space for Avis vehicles. Also on Battery Street, within the garage build-

* Building skin of the high-rise is 50 percent glass and 50 percent wall (insulated.)

ing, are a small coffee shop and a cigar store.

The project proposes the following changes in the garage and its included uses: 1) an off-street loading area would be provided on the first floor (thereby removing twelve parking spaces, the Avis office and the cigar store); 2) a service ramp would connect the loadings area to the service elevator in the high-rise; and 3) pedestrian access would be provided from the south side of the garage through a walkway to the low-rise and the high-rise.

D. PROPOSED SCHEDULING AND POSSIBLE INCREMENTAL DEVELOPMENT

Estimated Schedule

The present estimated project schedule is as follows:

- o Begin demolition of buildings on Parcels 2-5 by January 15, 1975, or as soon thereafter as feasible.
- o Begin excavation and foundation construction by March 1, 1975.
- o Start construction steel frame by July 1, 1975.
- o Complete steel frame by December 31, 1975.
- o Occupy selected areas of buildings by July 1, 1976.
- o Complete project by April 1, 1977.

Possible Incremental Development

The existing two-story restaurant building on Parcel 5 may not be available for demolition at the start of the project. The tenant's present lease extends through September 1978. Negotiations are underway for the tenant's earlier vacation of the property, but no agreement has been reached.

Availability of the building would affect the date for completion of the replacement low-rise. However, the developer estimates that the building would be available in sufficient time to permit completion of the total project by April 1, 1977.

III ENVIRONMENTAL SETTING

A. THE PROJECT SITE AS IT EXISTS BEFORE THE PROJECT

Geophysical*

Soils, Soil Stability, Seismology, Areal Settlement

The site is essentially level at very nearly Elevation 0, San Francisco City Datum (which is 8.6 feet above mean sea level). It was reclaimed from the San Francisco Bay by earthfilling. Soil characteristics for the site (and virtually all buildings in the immediate area) require that foundations be supported on piles.

Potential for liquefaction of the bearing sand layer during a major earthquake is small. There are no faults or shear zones** near or projected through the immediate area of the site. There has been no evidence of surface faulting within several miles of the site.

Minor areal settlement may be presently occurring as a result of fill loads over the soft, compressible marine clay locally termed "Recent Bay Mud."

Hydrology, Water Quality, Mineral Resources

Groundwater near the site in 1966 was at Elevation -9 feet (San Francisco City Datum). Measurements have not been recorded recently, but at nearby locations the level in the sands below the Recent Bay Mud has been reduced to below -20 feet by dewatering of large construction projects between 1966 and 1970.

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* Additional information and references for all data in this section are documented in Appendix E, Soils, page A-81.

** Shear zones indicate earth deformation, and therefore indicate the possibility of the presence of a nearby fault.

It is likely that the level is now between -10 and -20 feet and may still be rising slowly. The quality of groundwater is not high enough for consideration as a potential economic source of potable water; groundwater is brackish because of its nearness to the present Bay shoreline. Recharge of groundwater is negligible.

Erosion, Sedimentation, Runoff

The site is covered by pavements and buildings. Surface water or ponding as a result of accumulation of rain water in low spots is infrequent because surface water generally drains from the paved areas and travels by the way of gutters to the municipal sewer system.

Site Improvements

The built-up site includes five buildings ranging from two to six stories in height. All were built between 1908-1912. Sixty-five percent of the total 212,100 square feet of building area is used for office uses; retail uses (mostly ground floor) occupy 12 percent; and parking and related automotive service uses occupy 23 percent. (See Table 2, page 17.) The buildings, in average condition, are fairly representative of downtown buildings which have not been renovated in recent years.

Coldwell Banker, rental agent for the office buildings, has stated that office rentals on Parcels 2,3 and 4 ranged from 35-50 cents per square foot. Most tenants were small, one-person offices. Many were manufacturers' representatives; others included shops for liquor, clothing, tobacco, restaurant, travel agency and a savings and loan institution. Parcels 2,3 and 4 are essentially vacant now (see discussion under "impacts"), as a result of the developer's indication to tenants of plans to demolish the buildings.

Parcel 5 is still occupied by a restaurant. Parcel 7, the garage, is still occupied as mentioned in Section II, Project Description.

An estimated 350 persons were employed on the site in about 225-250 business operations for office and retail uses before major buildings were vacated. (Source: Coldwell Banker and Sedway/Cooke).

Table 2

EXISTING BUILDING CHARACTERISTICS ON PROJECT SITE

Parcel	Address	Number of Stories	Date Building Constructed (b)	Gross Building Area (Estimated) and Uses			
				Office	Retail	Parking	Total
2	7-15 Front St. (a)	6	1912	70,100	10,200 (d)	--	80,300
3	408-422 Market St. (a)	5	1910	22,800	3,500 (d)	--	26,300
4	426-444 Market St. (a)	5	1910	43,800	6,700 (d)	--	50,500
5	450 Market St. (a)	2	1910	--	3,700	--	3,700
7	32-40 Battery St.	3	1908 (c)	--	1,600 (d)	49,700	51,300
	TOTAL			136,700	25,700	49,700	212,100

(a) Building to be demolished.
(b) Source: City Assessor's Office.
(c) 2nd and 3rd floors added in 1948.
(d) Ground floor retail only.

Natural, archaeological, historical, cultural and scenic aspects of the site are discussed in Section B following concerning "the surrounding properties."

Legal, Policy, Institutional Constraints

The basic legal constraints for the site are included in the City Planning Code:

- Zone: C-3-0, Downtown Office District.
- Principal uses permitted: downtown offices and a variety of other commercial uses.
- Conditional uses: include parking garage.
- Maximum building height: 700 feet
- Bulk limitation: floor area not to exceed 14.0 times the area of the lot, plus bonuses and floor area transfers permitted by Sections 122.3 and 122.4. Bulk district: I-700
- Maximum building length: 170 feet.
- Maximum diagonal dimension of building: 200 feet.
- Off-street parking: none required
- Off-street loading spaces: a) For office uses, three spaces for gross floor area over 500,000 square feet, plus one space for each additional 400,000 square feet exceeding 500,000. (By interpretation, the City is requiring three spaces from 500,001 - 700,000 square feet and four spaces from 700,001-900,000 square feet). b) For retail uses, one space for gross floor area between 10,001-60,000 square feet.

The following statements in the City's Urban Design Plan are pertinent to the project:

- "Tall buildings should be clustered downtown and at other centers of activity to promote the efficiency of commerce and avoid unnecessary encroachments upon other areas. Such buildings should also occur at points of high accessibility, such as rapid transit stations in larger commercial areas."
- "Where new buildings reach exceptional height and bulk, large surfaces should be articulated and textured to reduce their apparent size and to reflect the pattern of older buildings."
- "Market Street should be intense, lively and humanly scaled."
- "Avoid extreme contrasts in color, shape and other characteristics which will cause new buildings to stand out in excess of their public importance. Large buildings are most consistent with the visual unity of the city when they are light in color."

* * * * *

Site photographs and ground floor uses, existing building heights and ages of buildings on the site and adjacent area, are shown on Illustrations 5,6,7 and 8, pages 20 through 23.

B. THE SURROUNDING PROPERTIES

Air Quality Environment

San Francisco receives relatively clean ocean air, under the frequent westerly or northwesterly wind patterns, and its topography is more conducive to good ventilation than that of many other Bay Area locations. (Note: Winds are named for the direction from which they blow). Thus, the City generally has better air quality than many other locations, despite its relatively high degree of contaminant-generating activity. The site environment has similarly favorable characteristics.

The Bay Area Air Pollution Control District has operated air sampling stations in San Francisco for many years. 1973 data from the nearest sampling site near Ellis and Van Ness Streets indicate generally favorable conditions with respect to State and Federal standards for levels of carbon monoxide, nitrogen dioxide, particulate matter and oxidants. There was one notable exception concerning particulate matter. On ten days of the year the Federal standard was exceeded for daily levels of particulate matter. Because Federal standards specify that this daily level shall not be exceeded more than once per year, there were nine days of excess.

Additional data on air quality is discussed in Appendix B, pages A-28 through A-34.

Noise Environment

During the daytime, traffic on the adjoining streets to the site and construction noise on Market Street determine overall environmental noise. Peak noise levels, as measured near the project site, varied from 78 to 85 dBA* due to truck, bus, and construction equipment passbys with average noise levels recorded 68 to 71dBA. Average noise, a result of many sources over a wide area, is heard as a general roar of undifferentiated sound. The major contributor to the average level is transportation noise. During lulls in the traffic, the minimum noise level of 63 dBA was recorded.

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* decibels with the A-weighted filter (see page A-72)

A

B

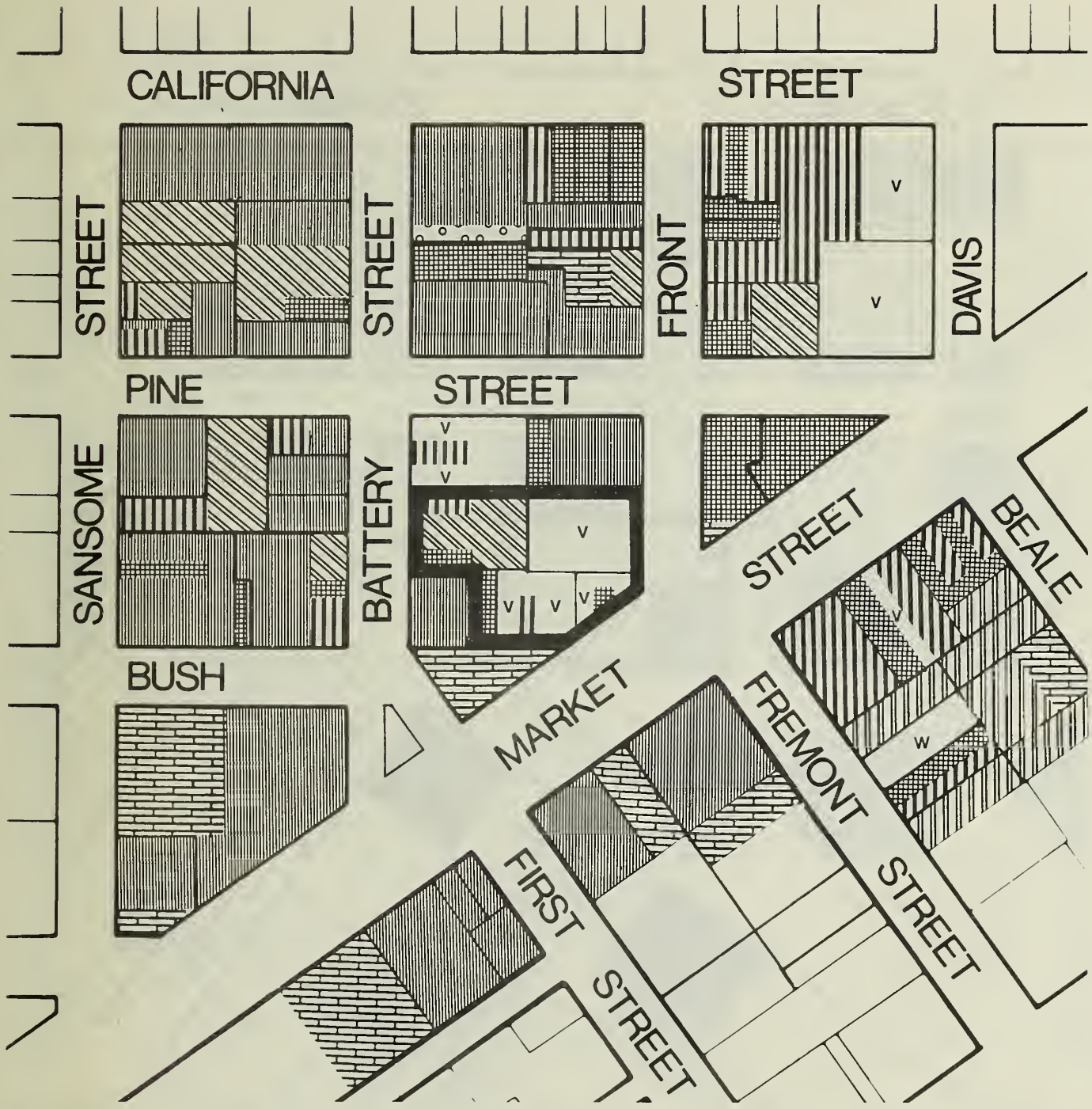
C

SITE PHOTOGRAPHS

Illustration 5

(See Illustration 9 for orientation diagram to photographs).

444 MARKET STREET PROJECT
SAN FRANCISCO, CALIFORNIA



GROUND FLOOR USE

Illustration 6

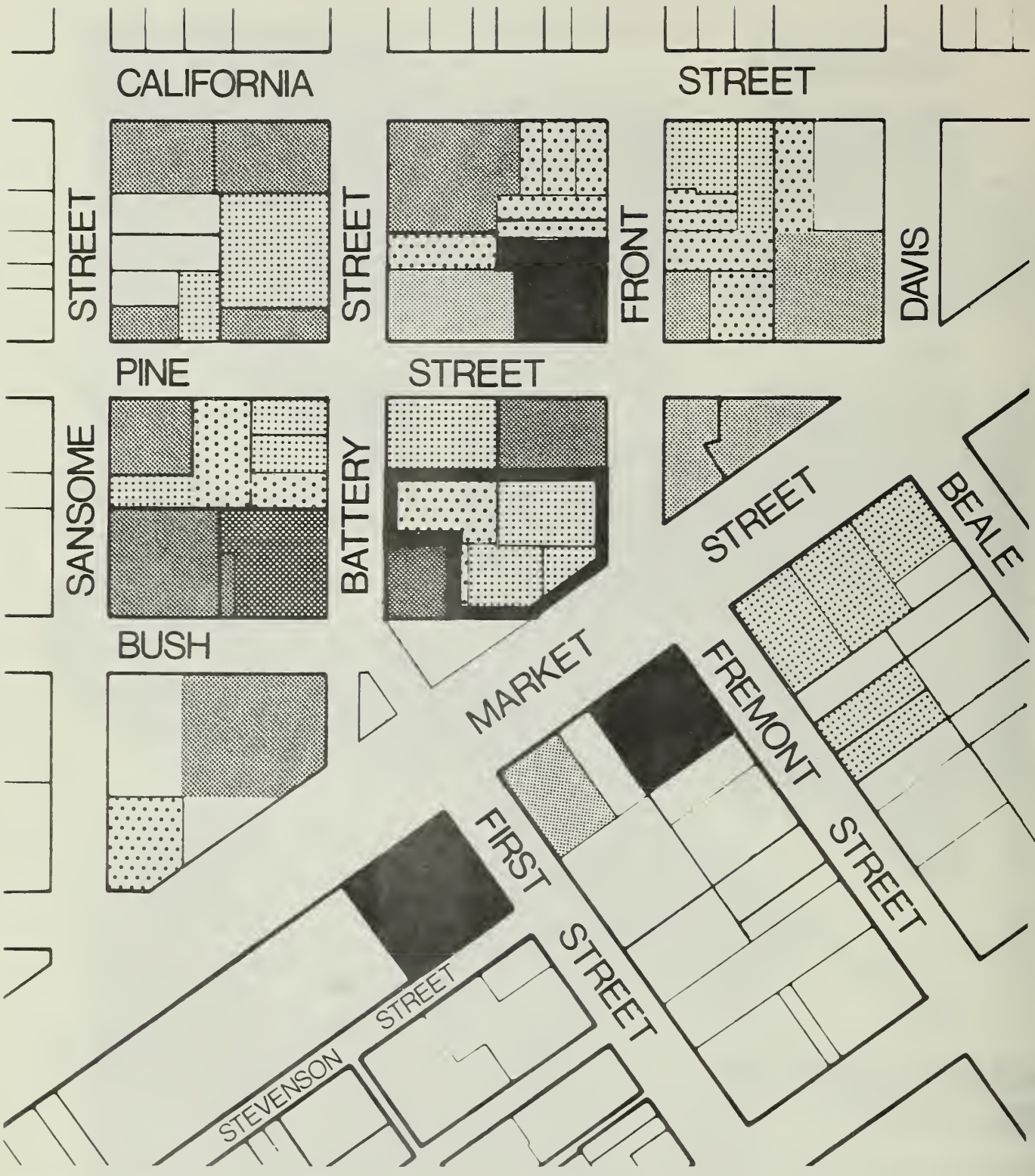
- Banking/Office
- Retail/Commercial
- Food
- Religious
- Parking
- Open Space (Privately Owned or Public)
- w Warehouse
- v Vacant

Note: Floors above grade level generally are in office or related use.

444 MARKET STREET PROJECT
SAN FRANCISCO, CALIFORNIA

0 100' 200'

NORTH



EXISTING BUILDING HEIGHTS

Illustration 7

- 1 to 3 Stories, 13 to 39 Feet
- 4 to 6 Stories, 52 to 78 Feet
- 7 to 10 Stories, 91 to 130 Feet
- 11 to 20 Stories, 143 to 260 Feet
- 21 to 30 Stories, 273 to 390 Feet
- 31 Stories or More, 403 Feet or More

444 MARKET STREET PROJECT
SAN FRANCISCO, CALIFORNIA

0 200' 400'

NORTH

BUILDING AGE AND FUTURE PROJECTS (1)

Buildings Constructed Prior to 1960

Buildings Constructed in 1960 or after

(1) Age estimated from visual survey, supplemented by available architectural guide books. (2) Mechanics Monument, 1899. (3) 130 Bush Street, 1910. (4) Crown Zellerbach Building, 1959. "Ushered in office building boom of the 1960's" (A Guide to Architecture in San Francisco and Northern California, 1973). (5) See Table 4, "Future Office Building Projects (in Construction, in Design or Potential Near 444 Market Street)"

Illustration 8

0 100' 200'

NORTH

The acoustical environment is quieter during the evening when noise from local traffic decreases and human activities are reduced. The peak noise levels of 78 to 80 dBA are generated by vehicles passing over the ventilation grating in Market Street adjacent to the site. Aircraft flyovers, stop and go traffic, and noise generated by GMC 8-cylinder Muni Buses also contribute to the "peak" noise levels. Average evening noise levels due to vehicular traffic are 62 to 65 dBA, with a minimum noise level recorded at 50 dBA. Noise generated by distant traffic is more noticeable at night.

Noise level measurements, made by Buonaccorsi & Associates for Sedway/Cooke on September 16-17, 1974, and additional data on noise and noise impacts are discussed in Appendix D, pages A-71 through A-80.

Land Use Characteristics

Buildings in the area are primarily used for offices with ground floor space mainly used for banking/office; retail/commercial (including restaurants and coffee shops); parking lots and garages; and open space (Illustration 6). Open space is open to the public but privately owned -- except for the immediately adjacent Mechanics Plaza, a recently improved public park/sitting area at the intersection of Market and Battery Streets. Vacant floor space in the area is minimal.

Of the four highest buildings in the area, three (31 stories or more) were built after 1960 -- the only other nearby building taller than twenty stories was built before 1960. Extensive new construction has occurred since 1960, with most buildings exceeding ten stories (Illustrations 7 and 8).

Plant and Animal Life

Because the project site is completely improved with buildings and pavement, there are no plants growing naturally on the site; in fact, there is no landscaping of any type. The only animal life on the site are insects, and possibly rodents, typical of a built-up downtown site. Thus, there is no plant or animal life or a rare or endangered species on the site.

The same is true of properties in the general vicinity of the project site, except that there are some street trees, recently planted along Market Street, and some cultivated landscaping on the sites and plazas of new office buildings in the area. The only animal life is insects and soil animal life associated with such cultivated landscaping.

Archaeological, Historic, Cultural, Scenic

The project site and the area immediately adjacent to the site was originally underwater, i.e. the original shoreline was west of the site. (Source: the "Official Map of San Francisco (1849)" as compiled from field notes of the official re-survey made by William M. Eddy, CE, 1849). Presumably, therefore, anything of possible archaeological importance on the site would be associated with a ship sinking or some associated marine event, and not with a human settlement on land. Records of ship sinkings along the San Francisco coastline have not been investigated for this EIR.

The City's List of Designated Landmarkes (Appendix A to Article 10, City Planning Code) does not include any building, site or object on the project site or in the immediate vicinity. Furthermore, there are no buildings on the site for which possible historic landmark status is being discussed by the City's Landmarks Board.

The building at 130 Bush Street, built in 1910, is the only structure in the project area listed for its architectural importance in A Guide to Architecture in San Francisco and Northern California (1973). (See Illustration 8, page 23). The Pacific Stock Exchange, 301 Pine Street at the southwest corner of Battery Street, is the only building in the project area listed in Here Today.

There are no aspects of the project site which have cultural or scenic importance. The primary visual and scenic quality (which is rapidly improving in the area) involves the recently installed street trees, sidewalks, light standards and other right-of-way improvements along Market Street and the landscaped plazas of new office buildings on Market Street.

There is a good long distance view looking east on Market Street to the Ferry Building.

Recent and Proposed Projects

More than three million square feet of office space has been built in seven projects near the site since 1959 (Table 3, page 27). A September 1974 survey of rental agents or building owners by Sedway/Cooke indicated that 98% of that new space is occupied.

Six projects (in addition to the subject project) are now being constructed or designed in the area. All private, except for the Yerba Buena Center Redevelopment Project, they include over four million square feet of office space. A seventh project, Gateway Plaza, has been dormant for three years and the Transbay Terminal site represents an eighth location potentially available for new office construction (Table 4, page 28, and Illustration 8, page 23.)

* * * * *

Photographs of the area adjacent to the site are shown on Illustration 9, pages 30-31.

Table 3

AREA AND OCCUPANCY OF OFFICE BUILDINGS
BUILT IN PROJECT AREA SINCE
1959

Building/Address	Approximate Gross Office Area (a) (Square Feet)	Year Occupancy Began
One Metropolitan Plaza 425 Market Street	1,100,000	1973
Tishman Building 525 Market Street	1,000,000	1973
Standard Oil Building 555 Market Street	306,000 (est.)(b)	1965
Pacific Insurance Building 100 Pine Street	362,000	1972
Barclays Bank Building 111 Pine Street	200,000	1965
Hongkong Bank Building 160 Sansome Street	92,500	1966
Crown Zellerbach Building 1 Bush Street	259,500	1959
TOTAL	3,320,000	
TOTAL AREA OCCUPIED (a)	3,265,500	
PERCENT TOTAL AREA OCCUPIED	98.4%	

(a) Based on telephone survey of rental agent or building owner by Sedway/Cooke (September 1974)
(b) Gross building area reported as 340,000 square feet.

Table 4

FUTURE OFFICE BUILDING PROJECTS
(IN CONSTRUCTION, IN DESIGN OR POTENTIAL NEAR 444 MARKET STREET)

Project Name And/Or Location	Gross Area in Office Buildings (Square Feet)	Project Status
1. Yerba Buena Center Redevelopment Project[a]	683,000	Portions of YBC project in design
2. Southern Pacific Railroad. Two office buildings (forty-three stories and twenty-eight stories) in the block bounded by Market, Steuart, Mission and Spear Streets.[b]	1,800,000	In construction
3. Standard Oil. Forty story building at 575 Market Street.[c]	568,000	In construction
4. Bechtel Corporation. Two twenty-four story buildings in block bounded by Market, Beale, Mission and Fremont Streets.[d]	1,100,000	In design
5. Howard & Main Office Building (Borel Company). Thirteen story building, northeast corner of Howard and Main Streets.[e]	235,000	In design
6. Bank of Tokyo. Twenty-three story building at northeast corner of California and Sansome Streets.[d]	350,000	In design
7. Gateway Plaza Project. South side of Mission between Main and Beale Streets.[f]	Unknown	Project dormant for past three years

(Cont'd.)

Table 4 (Continued)

8. Transbay Terminal site. South side of Mission between Beale and First Streets.[f]	Unknown	Potential project location
TOTAL	4,736,000 square feet in six of eight projects	
ESTIMATED NET OFFICE SPACE (@ 85% of total)	4,025,600 square feet in six of eight projects	

FOOTNOTES:

Data Sources:

(a) Draft Environmental Impact Report for YBC Project, May 1973.
(b) Office of Welton Beckett and Associates
(c) Office of Hertzka & Knowles
(d) Office of Skidmore, Owings & Merrill
(e) Office of Jorge de Quesada
(f) S. F. Department of City Planning

D

E

F

G

AREA PHOTOGRAPHS

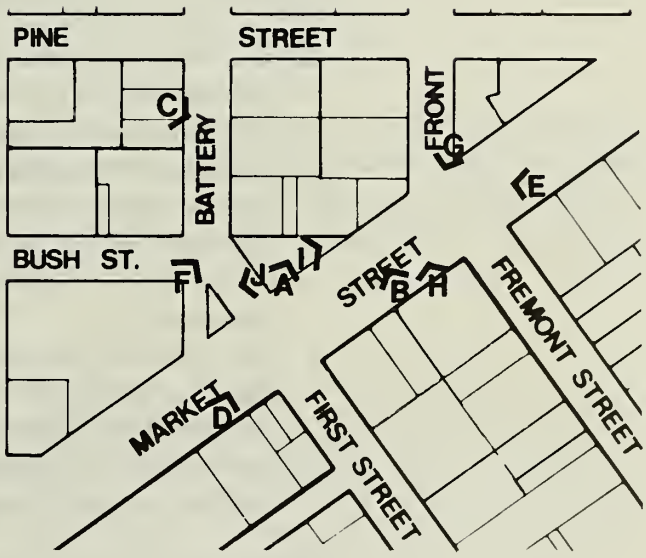
Illustration 9

444 MARKET STREET PROJECT
SAN FRANCISCO, CALIFORNIA

H

I

J



AREA PHOTOGRAPHS

Illustration 9 (cont.)

444 MARKET STREET PROJECT
SAN FRANCISCO, CALIFORNIA

IV ENVIRONMENTAL IMPACT OF THE PROPOSED ACTION

Environmental impacts discussed in this section are considered to be long-term or permanent, except that impacts that would occur during the construction stage of the project are generally considered as short-term or temporary, unless otherwise stated.

A. PLANNING STAGE OF THE PROJECT

City Planning Code

The project would comply with all requirements of the City Planning Code, except one. The 170-foot maximum building length permitted by the Code would be exceeded by about $2\frac{1}{2}$ feet for the high-rise. (See page 18).

Several factors contribute to the maximum being exceeded:

- o The corner site is irregular in shape.
- o The intent of the design is to keep the high-rise as close as possible to the property line on Market Street.
- o The developer hopes to build as much floor space within the high-rise as can be efficiently achieved, subject to constraints of the irregular site and other factors such as efficient use of elevators.
- o The intent of the design is to have the west facade of the high-rise line up directly with the west facade of the One Metropolitan Plaza Building, which is directly across Market Street.
- o The site plan dictated placing the north side of the high-rise as close as possible to the 111 Pine Building.

The Planning Commission would have to review and approve this variation from bulk requirements.

Buildings of varied heights would occupy the site for the forseeable future, assuming there is no major change in Code regulations for the site. (The proposed new high-rise, new low-rise and existing garage to remain would use nearly all the floor area permitted by the Code for principal uses and accessory uses on the

entire site. Therefore, if a replacement building were to be proposed for the garage at some later time, the replacement building could be as large in bulk as the garage only if it also were an accessory use, e.g. parking. Otherwise the replacement building would have to be considerably smaller).

Urban Design Plan

The project generally would conform with objectives of the City's Urban Design Plan which are applicable to the site. (See page 18). Specifically, it would locate a tall building at a point of high rapid transit accessibility in the commercial area; would provide a high-rise design which articulates and softens building surfaces to reduce the appearance of the building's mass; and would provide the density and type of uses which would intensify pedestrian activity on Market Street.

The project also would conform to the objective of the Urban Design Plan which states "Avoid extreme contrasts in color, shape and other characteristics which will cause new buildings to stand out in excess of their public importance. Large buildings are most consistent with the visual unity of the city when they are light in color."

B. ACQUISITION STAGE OF THE PROJECT

Displacement

An estimated 225-250 business operations, employing about 335 persons, would be displaced from buildings proposed to be demolished on Parcels 2,3,4 and 5. At this writing, displacement on Parcels 2,3, and 4 is nearly complete -- the moving having been prompted by notices from the developer of his intention to demolish the buildings.

Coldwell-Banker, rental agent for the subject buildings, does not know of any specific hardships imposed on tenants who have moved. The agent stated that many previous tenants tended to relocate in the immediate area. For example, many went to the Shell Building (100 Bush Street); others went to 600 Market Street and 369 Pine Street. Because many of the tenants were manufacturers' representatives, some relocated near the San Francisco Airport. Knowing specifically of only one tenant who moved out of San Francisco, the agent estimates that no more than five per-

cent of the tenants moved out of the city. He knows of no business which has ceased to operate.

The developer has advised all former office and retail tenants that they may become tenants of the project. Two, the Imperial Savings and Loan Association and See's Candies, have indicated their intention to temporarily relocate and then move into the project after its completion.

Four retail businesses are still onsite in buildings proposed to be demolished. Of these, the rental agent indicates that financial settlements for cancelling present leases is the major reason that three of the businesses have not yet relocated. See's Candies is the fourth business.

Three businesses in the garage building, employing about 15-18 persons, would not be affected by the project. The garage operation, the coffee shop and Avis Car Rental would remain, although the storage space for cars and the office for Avis would have to be relocated within the project.

C. CONSTRUCTION STAGE OF THE PROJECT

Building Demolition: Area	Buildings on Parcels 2,3,4 and 5 with a total floor area of 160,800 square feet would be demolished.
Economic: Floor Space Inventory	Demolition would cause a loss in the City's inventory of moderately-priced office (35-50 cents per square foot) and retail space: 136,700 square feet and 24,100 square feet respectively.
Circulation/Parking/ Loading	Construction activities would require closing the parking/loading lane on the westerly side of Front Street. This would impact traffic flow, especially during the PM peak period when the lane is used for the left turning movement from Front Street onto Pine Street. It also would close four loading spaces which are used to service businesses on both sides of Front Street.
	An additional lane on Front Street would have to be closed for about one week to accommodate construction of a manhole to the sewer line in Front Street, and, at random times, to accommodate delivery of heavy materials. These closings would have additional impact on traffic flow on Front Street.

The three-space loading zone turnout on Market Street would be closed. That action probably would only affect deliveries to the property at the corner of Battery and Market Streets.

Sidewalks adjacent to the project site on Market Street and Front Street would be closed. Pedestrian movements would be slightly impeded, but access would be provided by the developer through temporary covered walkways, in full compliance with City regulations.

(See Appendix A, pages A-1 through A-27 for complete documentation about circulation and transportation. Discussion of impacts begins on page A-14.)

Air Quality

Some increased emissions would be caused by: 1) dust generated in demolishing buildings, moving and loading debris, and unloading and handling some construction materials; 2) increased emissions from construction machinery and vehicles generated by construction activity; and 3) increased emissions from other vehicles forced to reduce their speed because of street obstructions or other construction activity.

There is no reliable basis for estimating the amount or impact of emissions from any of these sources.

(See Appendix B, pages A-28 through A-34, for documentation about air quality. Discussion of impacts begins on page A-31.)

Noise

Construction noise would cause short-term "great impact" lasting through completion of the project. It would be greatest during the first four months of construction involving demolition, excavation and pile driving operations. There are certain periods when noise levels would be of less impact, e.g. during interior finish work; however, construction noise generally would be a source of speech interference and annoyance to pedestrians and employees in adjacent buildings.

Depending on the construction phase, the noise level in the vicinity of the project would reach 80 to 90 dBA at least six to ten times an hour. Pile driving would exceed these estimates for both level and frequency of occurrence.

Major equipment to be used would include a crane, pile drivers, large loaders and dump trucks. Blasting is not anticipated by the

developer.

Land Use: Mechanics Plaza

Public use of Mechanics Plaza would tend to be less than if there were no construction activity immediately adjacent. (See Illustration 3, page 10.)

Employment & Payroll

The project would generate approximately 90,000-97,000 man-days of construction time for employees directly on the job. Payroll for this on-site labor would be approximately ten million dollars. (Source: Swinerton & Walberg Company.)

D. OPERATION STAGE OF THE PROJECT

Person-Trips, Modal Split, & Pedestrian Circulation

The project would generate about 17,300 person-trips per working day -- an increase to the site of about 14,000. Modal split of these trips would be approximately 2800 by walking, 8900 by auto and 5600 by transit. (Tables A3 and A4, pages A-16 to A-18.)

Increased pedestrian circulation would intensify pedestrian activity on Market Street - an objective sought by the City's improvements to Market Street.

Nontransit Vehicle Trips

Nontransit vehicle trips generated by the site would increase from 1200 to 6400. Because there would be no increase in on-site parking spaces, the impact of most (6100) of the projected 6400 trips would be dispersed throughout the general neighborhood of the project. Approximately 330 vehicle trips per day for service purposes would have to be accommodated adjacent to or within the project. (Table A5, page A-19.)

Peak Period Nontransit Vehicles

Before major office buildings on the site were vacated, existing development generated an estimated 210 nontransit vehicles during the AM peak period; 260 during the PM peak period. The project would generate approximately 1140 and 1440 nontransit vehicles, respectively, during the AM and PM peak periods. (Table A7, page A-23.)

Parking Demands

The project would increase work/business parking demand generated by the site from approximately 230 to 1010 spaces. (Table A6, page A-20.)

The existing parking garage is now filled each day to an average of 75-80 percent of capacity -- with buildings on Parcels 2 and 3 essentially vacant. Sedway/Cooke estimates that the garage would be filled to an average of 95% capacity after the project is completed, and would serve about 60 cars per day more than at present. (See page A-21 for assumptions.)

If more spaces were to be available for occupants of the proposed project, then persons now parking in the garage would be displaced.

Other impacts, regardless of who parks in the existing garage, would be increased competition for existing off-street parking in the general neighborhood of the proposed project, and a net reduction of nine off-street parking spaces which now serve the site and the surrounding area.

Service/Loading

The proposed project would generate 320-340 nontransit vehicle trips per day for sales, service, and freight loading/unloading. (Tables A5 and A6, pp. A-19, A-20) The 160-170 vehicles involved would use both existing on-street spaces and the proposed four off-street spaces. (See Illustration 2, page 8 for location of the project's loading area.)

Unless off-street loading within the garage is relatively easy and convenient, and/or unless parking regulations are rigidly enforced by the San Francisco police, a large proportion of service vehicles probably would service the project from streetside, rather than from the off-street loading area. (This, generally, is existing practice for other office buildings in the area.) If those vehicles park legally, there would be no impact. However, illegally parked service vehicles, also a common practice in the area, would have an adverse impact.

Use of the two interior-most off-street loading spaces would be limited to vans and trucks less than 24-25 feet long, which need no more than 10'3" overhead clearance. This limitation would not affect most service vehicles, which tend to be vans or van-type trucks. Larger trucks and semi-trailers could use the two spaces abutting Battery Street; only the largest would block the sidewalk. (See Mitigations, page 59.)

All trucks using the two off-street loading spaces abutting Battery Street would have to either back into the garage or onto

Battery Street from the garage. The same would be true for service vehicles (longer than 20-22 feet) which would use the two interior loading spaces. Circulation on Battery Street would be impeded for the length of time required to maneuver the service vehicle.

Vehicular Circulation

Accommodation of both automobile parking and off-street loading within the project garage would cause some additional congestion both on Battery Street and within the garage (due to space limitations for truck maneuvering and automobile arrivals on the first floor.) This congestion would aggravate the backup on Battery Street which now occurs two to three days per week during the morning peak period.

Transit Person Trips & Distribution

The proposed project would generate a site-related increase from the existing 900 transit person trips per day (before vacation of major office buildings) to 5600 transit person trips per day. The trips are estimated to be 30 percent for home-to-work purposes and 70 percent for nonwork (shopping and business). Percentage distribution of origins and destinations for total (home-to-work and nonwork) trips, home-to-work trips and nonwork trips, respectively, would be as follows: San Francisco - 82%,63%,90%; East Bay - 8%,18%,4%; North Bay - 2%,4%,1%; and South Bay - 8%,15%,5%. (Table A8, page A-24.)

Based on discussion with BART and Muni staff, the additional patronage estimated to be generated by the project would not have a negative impact on the services or facilities of BART or Muni. (4600 of the estimated 5600 transit person trips generated by the project would have an origin/destination area in San Francisco; these patrons would be using BART and Muni.) According to BART staff, patronage capacity of the BART system, not known at this time, is highly variable due to many factors including: level of service (number of cars in trains, scheduled headways), traffic flow conditions, speed, traffic control devices, patrons' tolerance level and patrons' interference.

Muni staff indicates that the new Muni Metro subway facilities -- with their doubled patronage capacity by 1975 over existing streetcar lines -- will accommodate patronage generated by the project.

Because of the low additional patronage estimated to be generated by the project for AC Transit, Golden Gate Transit, Greyhound and Southern Pacific, these carriers were not contacted. Sedway/Cooke estimates that the project would not adversely impact those transit systems.

Air Quality

Normal occupancy of the project would contribute an estimated maximum of one to three percent of the total emissions of the various contaminants within the project area. The emissions from buildings and vehicles generated by the project are estimated as follows, in pounds per day: carbon monoxide, 38.0; nitrogen oxides, 17.0; organic matter, 6.0; particulate matter, 1.6; and sulfur oxides, 0.2 . (At existing levels of air quality, changes of the order of three percent or less would be smaller than the error of measurement of most available instruments.) (Table A9, page A-33a).

Air quality projections indicate that the project would not increase the frequency of excesses (poor air-quality days) over applicable standards.

Wind/Comfort/ Shadows

The general finding from wind tunnel analyses is that the project would cause a general increase in wind velocities in the surrounding streets, and would create strong winds in some localized areas.

Winds: On-Site

The open landscaped plaza would be subject to high southerly winds. (Page 44 and Illustration A13, page A-58.)*

Along the roof terraces of the high-rise (floors 32-35), very high northwesterly winds would occur at the north end of the building -- the south end being sheltered by the building itself.** Southeasterly winds along the north end of the terraces would be moderately high.*** (Impact mitigated. See page 58.)

* South winds are expected to occur 12 percent of the time from December-February, exceeding 13 miles per hour one percent of the time. During other seasons, south winds are light and occur less than three percent of the time.

** Northwest winds, among the most frequent and strong winds at all seasons in San Francisco, occur 12 to 39 percent of the time, depending on the season. They exceed 13 miles per hour 35 percent of the time and 25 miles per hour three percent of the time in summer. Frequencies and speeds are lower in other seasons.

*** Southeast winds occur in winter about 17 percent of the time, with speeds over 13 miles per hour ten percent of the time. They are generally light in fall (occurring six percent of the time) and in spring and summer (occurring less than three percent of the time).

Winds: Off-Site

After project construction, winds generally would be increased on the northwest side of Market Street, especially near Front Street. At the east side of Front, between Market and Pine Streets, there also would be higher winds.

The areas found to be windiest are:

- The corner of Market and Front Streets during northwesterly winds (Illustration A7, page A-52), southwesterly winds (Illustration A11, page A-56), southerly winds (Illustration A-15, page A-60.), and
- The corner of Market and Fremont Streets during westerly winds (Illustration A9, page A-54) and southerly winds (Illustration A13, page A-58.)

Comfort

A comfort analysis* indicated that the project would increase discomfort to pedestrians mostly at the west corner of the Market/Fremont intersection during the spring, summer and fall seasons. Discomfort increases also would be generated at the east corner of the Market/Fremont intersection, along Market Street in front of the high-rise and on the easterly side of Front Street. The estimated percent of time that a pedestrian would experience the highest increases in discomfort during the spring, summer and fall seasons, before and after the project, is discussed on page 41. (There would be little or no increase in discomfort during the winter.)

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* See pages A-45 to A-48 and A-61 to A-68. Discomfort in the wind is caused by thermal cooling and mechanical effects such as flapping clothes, blowing dust and leaves and blowing hair. The rate of thermal cooling depends on a variety of factors that include clothing, temperature, sunshine, pedestrian activity and windspeed. The comfort analysis was made for the first day of each season at 1 PM (the hour when people would most want to be outdoors to eat lunch, shop or go for a walk.)

	NOW	AFTER PROJECT
o Spring (Illustrations A18 and A19, pp. A-63 to A-64)		
- west corner Fremont/Market	6%	14%
- east corner Fremont/Market	9%	11%
- Market Street at high-rise	2%	7%
- Front Street, east side	3%	9%
- Landscaped plaza	-	9-13% **
o Summer (Illustrations A20 and A21, pp. A-65 to A-66)		
- west corner Fremont/Market	6%	16%
- east corner Fremont/Market	7%	9%
- Landscaped plaza	-	10% **
o Fall (Illustrations A22 and A23, pp. A-67 to A-68)		
- west corner Fremont/Market	1%	10%

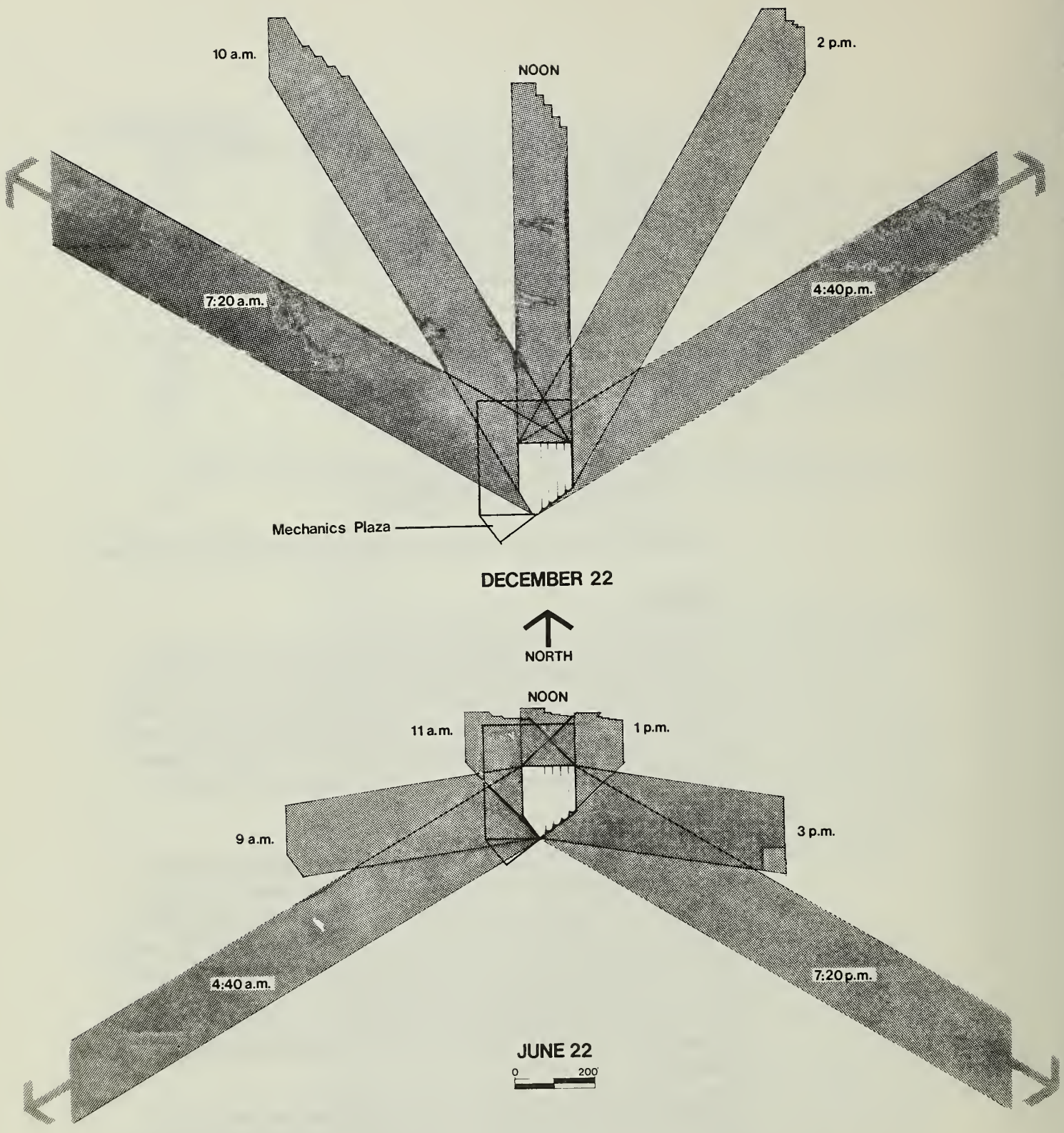
The project would not cause any discomfort on Mechanics Plaza.

Shadows

The high-rise would shade Mechanics Plaza only during the very early morning hours of the summer months, e.g. 4:40 AM on June 22nd. (Mechanics Plaza is the only major open space near the project of potential concern regarding shadows and the cooler temperatures the shadows cause). The plaza is shaded by existing high-rise buildings on the south side of Market Street, however.

The high-rise would shade the Front Street sidewalks during the mid-afternoon hours of winter and all afternoon hours of summer. During the summer, it also would shade the Market/Front/Fremont Streets intersection and adjacent sidewalks during the late afternoon hours. In this regard, however, note that the high-rise shadows indicated on Illustration 10, page 42, may superimpose on other shadows. Therefore, Illustration 10 does not necessarily indicate areas of "new" shadows created by the high-rise.

** Illustrations A17, A19, A21 and A23 indicate the comfort analysis as conducted for a previous low-rise and plaza design for the project. The present design would generate about the same off-site discomfort levels. However, discomfort would be somewhat less for the plaza.



SHADOW PATTERNS

Illustration 10

444 MARKET STREET PROJECT
SAN FRANCISCO, CALIFORNIA

0 100' 200'

NORTH

Light and Views: Adjacent Buildings

Light and views from the south side of the adjacent 111 Pine Building (111 Pine Street) would be completely shut off by the high-rise. This impact would be on the interior property line.

Windows on the south side of floors 8-18 would have to be blocked off by the owner of 111 Pine Street. This would eliminate all natural light to the elevator lobby and restrooms and some natural light and views (south side) for offices on those floors.

Note: Potential impacts of the type under discussion are anticipated and regulated by the City. Table 5-A (Opening Projection Based Upon Occupancy and Location) of the City Building Code permits buildings in Occupancy Group F, Division 2, (as defined in the Code to include buildings with uses such as wholesale/retail stores and offices) to have openings in building walls which are closer than five feet to the property line, provided: the openings are non-required for light and air; written consent of adjacent property owners is received; and the owner of the building with the wall openings agrees to protect the openings and to close them, as required by the Building Superintendent, with respect to subsequent improvements on the adjacent property. Both the 111 Pine Building and the proposed project are in the Occupancy Group F, Division 2, classification.

Noise

Parking Garage and Traffic

Increased use of the garage,* and increased vehicular traffic generated by the project on Pine, Battery, Front and Market Streets would not noticeably increase noise in the general area.

Mechanical Equipment in Buildings

Mechanical equipment noise would not impact the environment, provided, as proposed by the developer, all mechanical equipment air intakes and exhausts have appropriate silencers to prevent noise impact.

Geophysical

Areal Settlement

Basement excavation would relieve some of the fill loading, and building loads would be carried to deep supporting soils. The

* Up to 60 additional cars per day. See page A-21.

resulting effect on areal settlement would be expected to be minor. (Page A-84).

Seismic Response*

Because the site may be subjected to earthquake motion during the life of the proposed building, the foundation of the proposed structure would be designed to carry its load below the compressible Recent Bay Mud deposits to firm bearing materials, and the building would be structurally designed to resist the damaging effects of the earthquake motion. It is unlikely that the present seismic response characteristics of the site would be altered significantly, because soil-structure interaction effects have been shown to be small for structures of the type proposed.

Potential for liquefaction of the bearing sand layer during a minor earthquake is small because of the sand layer's density. (Page A-85.)

Demography

The project would add to the concentration of office employment in an area which the City considers desirable for such concentration. (References: The Comprehensive Plan of San Francisco and the City Planning Code.)

Utility & Waste Services

Water

Project demand for water would be 750 gallons per minute for fire service and 675 gallons per minute for domestic service.**

* The site is in a "Special Geologic Study Area" of the City. See the Community Safety Plan for the Comprehensive Plan of San Francisco, pages 44a and 54.

** Source: Skidmore, Owings & Merrill. Assumptions for fire service: 750 gallons per minute as required by San Francisco Building Code and NFPA (National Fire Protection Association) Pamplet 13.

Assumptions for domestic service:

(1)	Fixture unit method applied to proposed plumbing fixtures: 4000 fixture units =	550 gpm
(2)	Mechanical equipment such as cooling towers, boilers, etc.	+125 gpm
	Total	675 gpm

Adequate water service can be provided by the City of San Francisco from Front Street for all normal fire and domestic demands. No new services would be installed on Market Street. The project would cause negligible impact on the unused capacity of City water lines and on available water resources.

Sewers and Water Quality

The project would generate the following discharges to sewer and related facilities: 1) Sanitary: 80,000 gallons per day (average) or 1.11 cubic feet per second (peak); 2) Storm: 1.09 cubic feet per second.* Dry weather and wet weather discharges would represent less than 1% of the flow handled by the North Point Sewage Treatment Plant (the City plan which would receive the discharges until the planned expansion of the Southeast Treatment Plant is completed).

City combined sewers are adequate to accept the storm runoff within the design criteria for the once in five (5) year storm. Storm runoff which would exceed the sewer capacity would be transported on the street surface in street gutters designed to accommodate this flow.

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* Source: Skidmore, Owings & Merrill
Assumptions for sanitary sewer:

(1) Criteria; 1 person per 100 sq. ft.; 15 gallons per day per person

(2) Gross Area	730,000 sq. ft.
Non-occupied	- 200,000 sq. ft.
Occupied Area	530,000 sq. ft.

(3) Average Flow: 530,000 ÷ 100 x 15 = 80,000 gpd.
Peak Flow: Say 3 times average flow
3 (80,000 - 8 hours x 60 min. x 448.8) = 1.11 cfs

Assumptions for storm sewer:

(1) Criteria: Rational method: Q = A x I x R
R = 1.8" per hour rainfall, 35 year storm.

(2) Capacity: Q = 26,500 sq. ft. - 43,560 x 1.8 x 1 = 1.09 cfs.

A new manhole would have to be constructed, if, as proposed by the developer, a 12" lateral connection would be connected to the public 12" sewer on Front Street. The new manhole would be approximately in the middle of the Front Street right-of-way (± 35 feet from the property line of the project).

Water Quality in the San Francisco Bay will continue to be adversely affected by City sewage until the City is able to comply with water quality standards established by the California Regional Water Quality Control Board and by the State of California.

Thus the flow generated by the project would contribute to pollution of the Bay until, among other factors to be implemented pursuant to the City's Waste Water Master Plan, the North Point Sewage Treatment Plant is phased out and project sewage is handled by the expanded facilities and higher(secondary) treatment method now being designed for the Southeast Sewage Treatment Plant, pursuant to the Plan. (Additional detail is available in the Environmental Impact Statement and the Environmental Impact Report for the Waste Water Master Plan.)

Telephone

Full telephone service would be provided by the Pacific Telephone & Telegraph Company. The project would cause negligable impact on the services and unused capacity of PT&T facilities.

Solid Waste

The project would generate an estimated two to three tons of solid waste per day.* This amount would be less than 2/10ths

*The specific types of future tenants would determine the actual extent of solid waste generated. For example, computer-type businesses tend to generate much more waste than regular offices. (Elmer Johnson of the Building Owners Association indicated that the largest San Francisco office buildings generate about 1½ to 2 tons of solid waste per day. The California Solid Waste Management Control Board in Sacramento has no "standards" for monitoring solid waste discharge by any type of land use; but tentatively, for "normal office/commercial use," the Board suggests using a generation factor of one pound per 100 square feet of floor space. The three-ton estimate, above, results from application of the Board's factor.

of one percent of the 1700-2000 tons generated daily in the entire city.

Golden Gate Disposal Company, which is under City contract in the project area, would place the waste in a holding area at 501 Tunnel Ave in San Francisco and then transfer the waste within one day to the regional park sanitary landfill site in Mountain View. Because the latter site probably will be filled by November 1975, Golden Gate Disposal is now negotiating for additional land in the regional park and for three other sites. The Company anticipates no problems in obtaining a site.

City Services

Police

The San Francisco Police Department estimates that: 1) 0.7 police officer would be required to handle the increased police work related to incidents for which a police report would be generated by the project. (About 50 incidents in twelve months would require police reports); and 2) about an additional 1.6 traffic citations per day would be generated by the project -- a factor that would not adversely impact police manpower or services.

Fire

The San Francisco Fire Department states that the project: 1) would have no adverse impact on fire service in the City; 2) would not require the City to add any fire equipment or personnel to the Fire Department; and 3) would be assured good fire fighting capability by the sufficient number of high and low pressure mains and hydrants which are available in the immediate proximity of the project.

Economic

Employment

Sedway/Cooke estimates that all project uses would employ about 2050 persons. This would be a net increase of 1700 persons on the site, considering estimated employment before vacation of buildings on Parcels 2,3 and 4. (An extensive market analysis would be required to indicate whether there would be a net increase in "new jobs" for the City, or whether most of the jobs would be relocated from other City sites. Assumptions for employment: three employees per 1000 square feet of office space; one and a half employees per 1000 square feet of retail space.)

Floor Space Inventory

The project would add approximately 697,000 square feet (gross) of new office space and 38,000 square feet (gross) of new retail space to the City inventory. This would be an increase over existing space of 560,000 square feet and 13,000 square feet of office and retail space, respectively.

Fiscal*

The project would increase the property tax base in the City and County of San Francisco. Assessed valuation of the project, at completion, is estimated at $12,500,000. (Based on estimated project replacement cost, using developer's estimates for construction, interest, etc.) This represents a $11,330,000 net increase over the existing $1,170,000 site valuation.

Net increase in property tax, based on the above estimates, would be approximately $1,400,000, assuming a tax rate of $12.25 per hundred dollars of assessed valuation (1973-74 fiscal year.) Combined with a net increase projected for general sales and use tax of $23,000, total annual net increase in revenue would be $1,420,000. Other revenues directly attributable to the project from other sources would be negligible; these include the gross receipts tax, parking tax, permits, licenses, user charges and fees, etc.

Most City expenditures or budget items are not directly related to development on a specific site, e.g. social services, park and recreation, library, administration, employee retirement, tax collection, etc. There would be no school expenditures directly attributable to this non-residential project. The Fire Department states that the project would not require the City to add any fire equipment or personnel to the Department. The Police Department estimates $26,600 as the net annual increase in expenses attributable to the project for police services, and the Department of Public Works estimates that increased expenses for street maintenance in the project area would be negligible.

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* Data by Sedway/Cooke, unless stated otherwise.

In addition to the above, there would be certain potential costs and revenues which are directly attributed to the proposed project but are difficult to estimate. Some examples are: costs of transit delays (and hence transit operating costs) resulting from additional autos in the area; and general sales and use tax revenues from commuters' consumption of taxable goods and services in the City.

Net increase in revenue to the City and County would be about $1.3 million annually, as related to primary direct costs and revenues attributable to the project.

E. ENERGY CONSUMPTION*

1. The connected kilowatt load of the project is 10,690.5 KW.

2. The estimated average kilowatt hours of monthly consumption required to service all electrical needs a) in absolute amount is 1,400,000 KWH, and b) per square foot of interior floor space is 1.85 KWH/square foot.

3. Anticipated daily and annual electric load distribution curves are shown on Illustrations 11 and 12, both on page 50.

4. Estimated average consumption of gas (fossil fuel) in British Thermal Units** per square foot of interior floor space is 120 BTU/square foot/day.

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* The basic assumption for computation is that the project would consume approximately the same energy as existing new office buildings with similar energy use. Data on consumption is available for many buildings. Source of data in Section E: Skidmore, Owings & Merrill. Full gas and electric service will be provided by the Pacific Gas and Electric Company.

** One British Thermal Unit is the energy required to raise the temperature of one pound of water one degree Farenheit at 60 degrees Farenheit. The heat content of one cubic foot of natural gas is approximately equal to 1000 BTU.

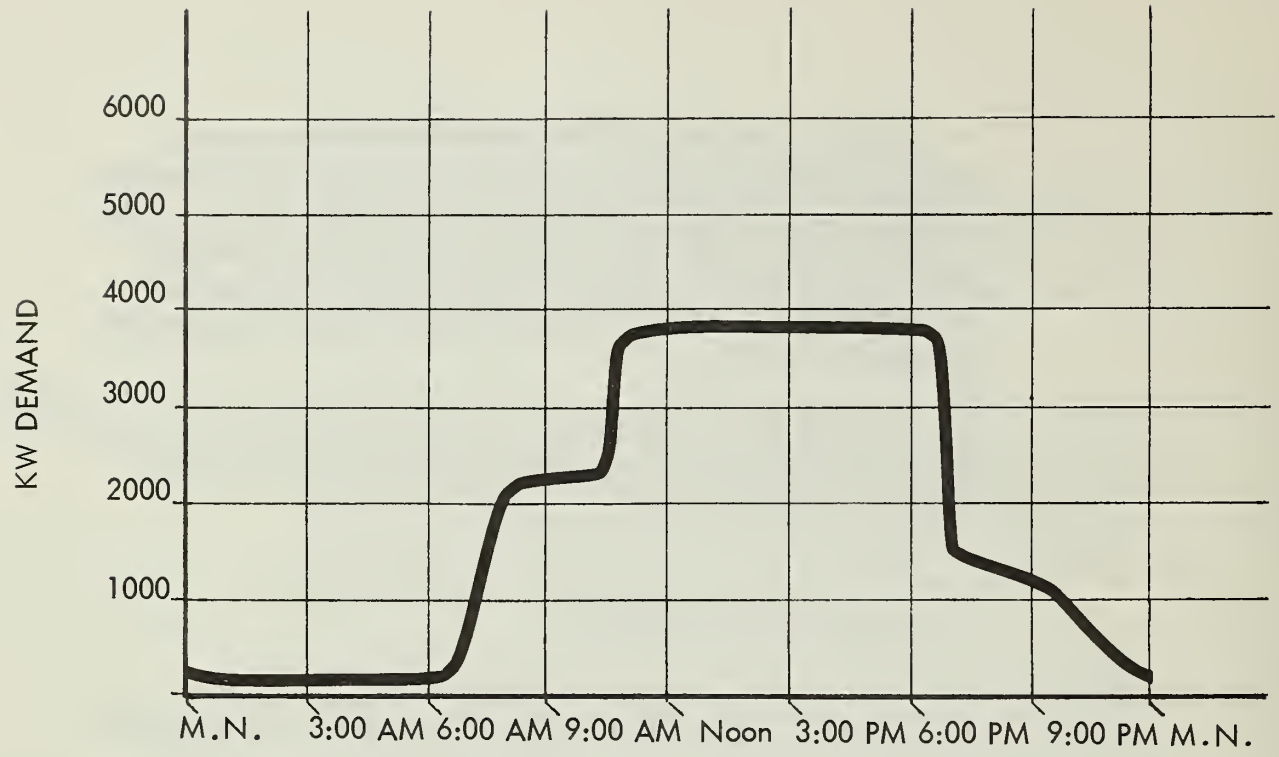

Illustration 11 ANTICIPATED DAILY ELEC. LOAD DISTRIBUTION

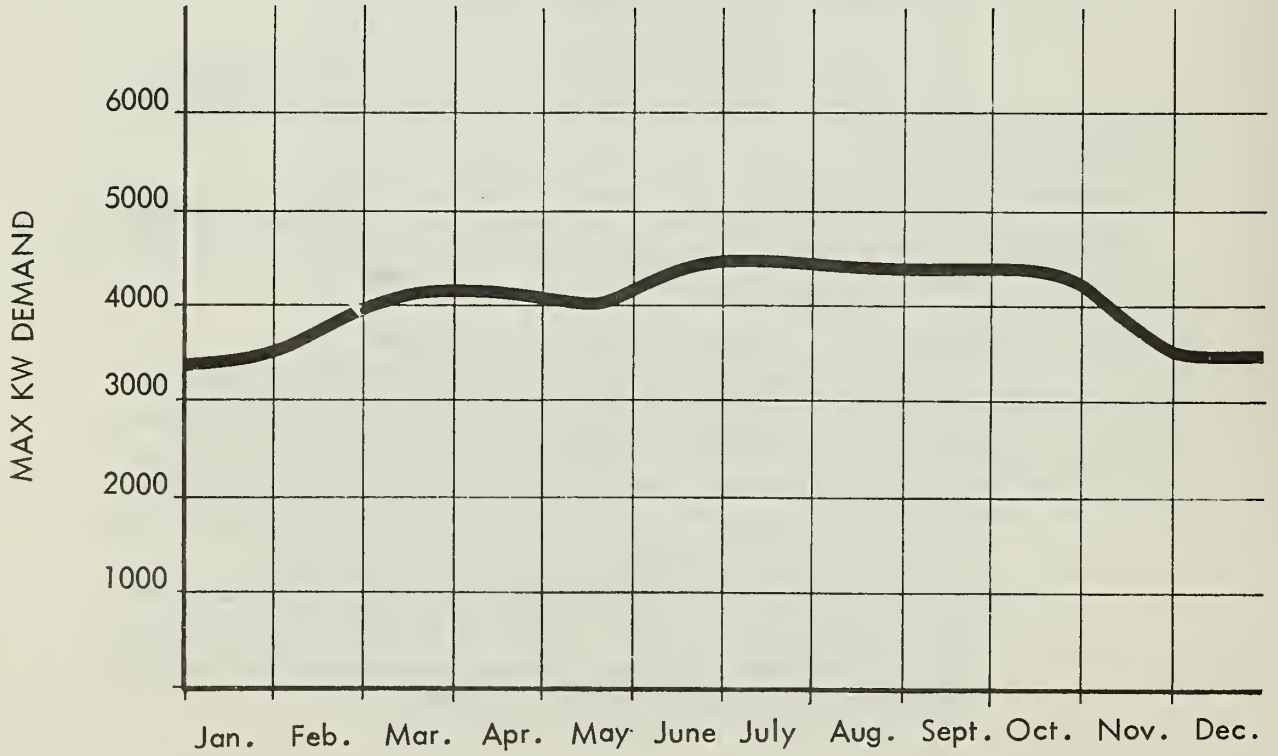

Illustration 12 ANTICIPATED YEARLY ELEC. LOAD DISTRIBUTION

5. Magnitude of expected peak gas (fossil fuel) consumption is 22,500,000 BTU per hour.

6. Anticipated daily and annual load distribution curves for natural gas consumption are shown on Illustrations 13 and 14, pp. 52 and 53, respectively.

Building skin of the high-rise is 50 percent glass and 50 percent wall (insulated). Less energy would be consumed for heating and cooling the proposed thin-skin high-rise than for heating and cooling a comparable building with an uninsulated exterior 12-inch wall of poured concrete -- the latter having a higher U-factor.

F. NO KNOWN OR ANTICIPATED IMPACT

The project would have no known or anticipated impact on the following:

- o Sites, buildings or objects of historic importance.
- o Soil stability. (Excavation walls would be shored to minimize or prevent displacement of earth into the excavation. Basement walls would be designed to resist permanent lateral loading from the adjacent soil.)
- o Ground water. (Water drawdown adjacent to the structures should not be required. If minor contamination of the gound-water were to occur due to utility line leakage, impact would be negligible.)
- o Erosion and sedimentation; land form features; runoff and drainage; and mineral and construction resources.
- o Plant or animal life.
- o Residential distribution or concentration of population in San Francisco or the Bay Area.
- o San Francsico schools.

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* (1) The heat transmission coefficient for the exterior glass in the high-rise is: U= 1.0 BTU/Hr. - Ft.^{2} degrees F.
(2) The heat transmission coefficient for the exterior wall in the high-rise is: U= 0.2 BTU/Hr. - Ft.^{2} degrees F.
(3) The heat transmission coefficient for a twelve-inch poured concrete wall without insulation is: U= 0.55 BTU/Hr. - Ft.^{2} degrees F.

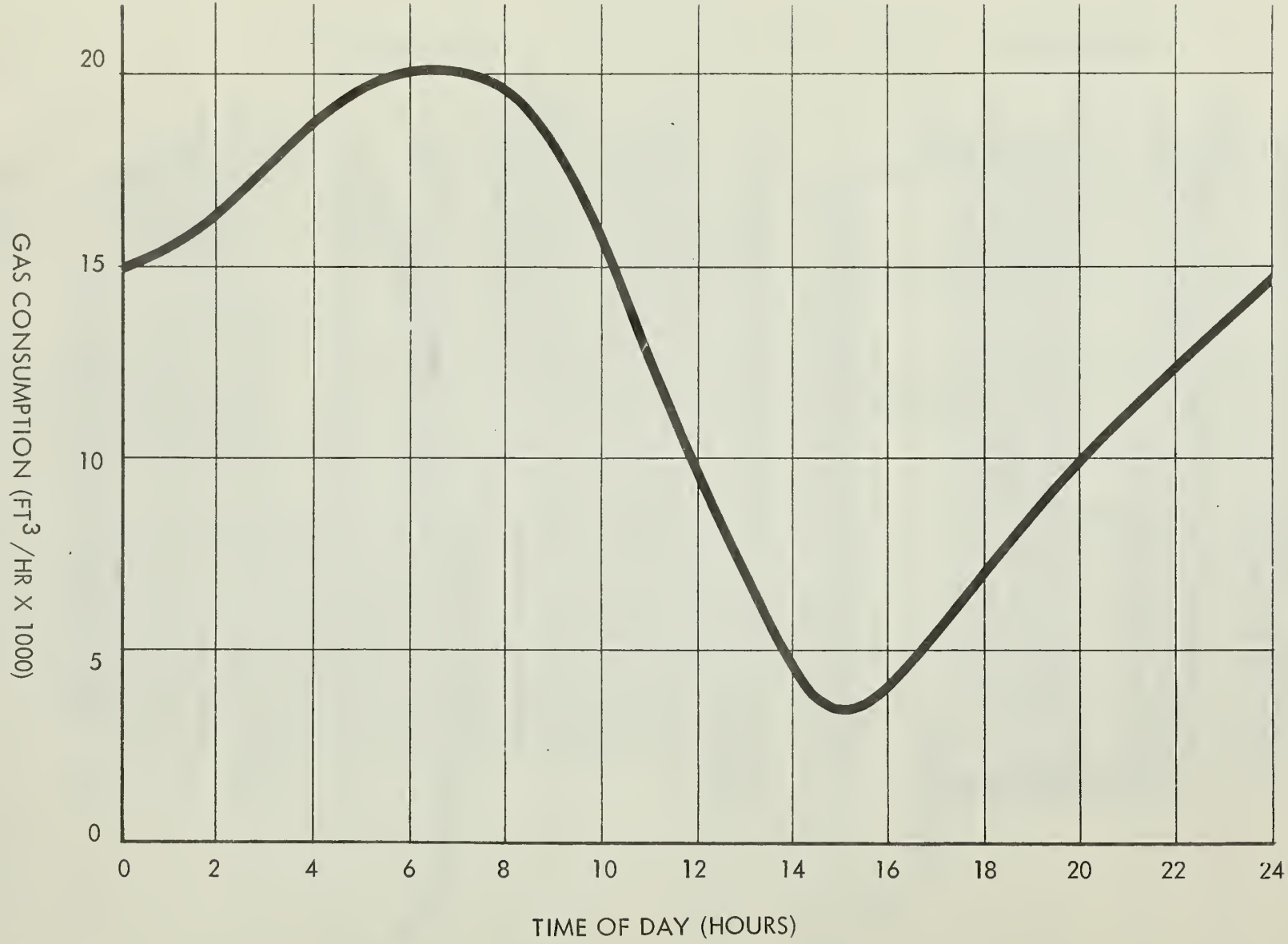

Illustration 13 DAILY NATURAL GAS LOAD DISTRIBUTION CURVE
(For Peak Winter Design Day)

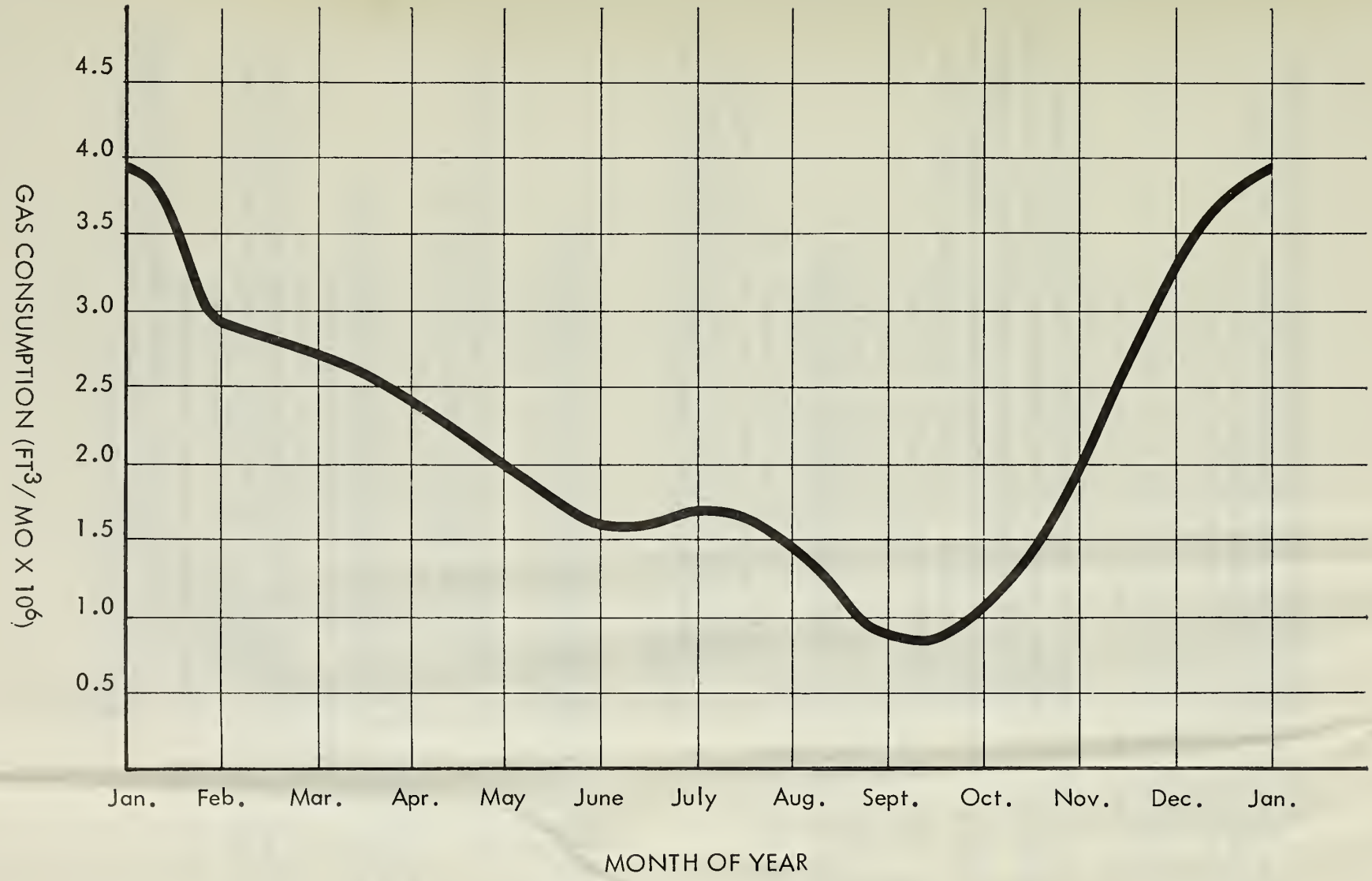

Illustration 14 ANNUAL NATURAL GAS LOAD DISTRIBUTION CURVE

V ADVERSE ENVIRONMENTAL EFFECTS THAT CANNOT BE AVOIDED IF THE PROJECT IS IMPLEMENTED

This section describes the kinds and magnitude of adverse effects, including those which can be reduced but not eliminated in the project as proposed. Specific figures of magnitude are indicated where they would not be too repetitious of previous discussion in Section IV, "Environmental Impact of the Proposed Action."

A. PLANNING STAGE OF THE PROJECT

- Would exceed, by about $2\frac{1}{2}$ feet, the 170-foot maximum building length permitted by the City Planning Code. Requires review and approval by Planning Commission. (See page 32 .)

B. ACQUISITION STAGE OF THE PROJECT

- Displacement of an estimated 225-250 business operations, employing about 335 persons. (See page 33 .)

C. CONSTRUCTION STAGE OF THE PROJECT

- Significantly increased noise; greatest during the first four months involving demolition, excavation and pile driving operations. (See page 35 .)*

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* Indicates that the impact might be reduced and that possible mitigation is discussed in Section VI, "Mitigation Measures Proposed to Minimize the Impact."

- Increased vehicular congestion on Front Street due to closing of parking/loading lane throughout the construction period and temporary closing of one additional travel lane as necessary to accommodate construction of a manhole and delivery of heavy materials. Vehicular congestion on Market Street due to trucks entering the site and to closing, during construction, of the three-space service zone on Market Street. (See page 34 .)*
- Loss in the City's inventory of moderately-priced office and retail space: 136,700 square feet and 24,100 square feet respectively. (See page 34.)
- Increased pollutant emissions and decreased air quality. (See page 35 .)*
- Removal of recently installed improvements to Market Street sidewalk. (See page 35)*
- Inhibited pedestrian movements due to closing, during construction, of adjacent sidewalks on Market Street and Front Street. (See page 35.)*
- Reduced public use of Mechanics Plaza. (See page 36 .)

D. OPERATION STAGE OF THE PROJECT

- Increase from 1,200 to 6,400 nontransit vehicle trips generated by site. Generation of 8,900 person trips by auto. Generally increased vehicular traffic in the vicinity. (See page 36 .)
- Increased parking demand generated by site from 230 to 1,010 spaces. (See page 36 .)
- Increased competition for existing off-street parking space in the blocks near the project which are now deficient in parking. Probable displacement of some existing patrons of project garage by project tenants. (See page 37 .)
- Generation of 320-340 nontransit vehicle trips per day for sales, service and freight loading/unloading. Probable increased illegal parking adjacent to site and consequent increased congestion. (See page 37 .)
- High velocity southerly winds at pedestrian level on project plaza. (See page 39.)

- Increased off-site winds and discomfort levels at the intersection of Market and Fremont Streets, the intersection of Market and Front Streets, and on Market Street adjacent to the high-rise. (See pages 40 and 41).
- Blockage of light and views from the south side of the adjacent 111 Pine Building (111 Pine Street.) (See page 43 .)
- Increased congestion on Battery Street caused by: 1) trucks having to back into or out of the garage for the off-street loading spaces; and 2) use of the garage for both off-street parking and loading. Difficult use of the two interior-most off-street loading spaces by large trucks with high overhead clearance requirements. (See pages 37 - 38.)*
- Increased use of water, gas, and electricity resources and of the unused capacity of facilities which provide the services. (See pages 44 - 46 and 49 - 53.)*
- Increased demand for City police, fire and street maintenance services. (See pages 47 - 49.)
- Increased pollutant emissions and reduced air quality. (See page 39.)
- Increased noise due to project-generated vehicles and to increased use of the project garage. (See page 43.)
- Increased generation of sewage (see page 45) and solid waste (see page 46), and increased reduction of water quality in San Francisco Bay (see page 46).
- Increased shadows in the winter months on built-up areas from northwest to northeast of the highrise. (See page 41.)

VI MITIGATION MEASURES PROPOSED TO MINIMIZE THE IMPACT*

A. PLANNING STAGE OF THE PROJECT

Wind

Off-Site

Mitigations for reducing additional off-site winds and discomfort levels generated by the project are not proposed.

On-Site Mitigations Already Completed

Mitigation measures and/or wind tunnel analyses already completed are as follows. In an early design concept for the high-rise, the roof terraces were on the west side of the building where winds were more severe. The terraces were moved to the east side of the building.

The first wind tunnel analysis by the Environmental Impact Planning Corporation (EIP) was made for a 32-story high-rise and a 2-story low-rise which was rectangular in shape and separated from the high-rise. Due to the high westerly winds recorded on the project plaza, a supplementary test also was made to determine the effect of roofing over the entire plaza. The latter test showed, under westerly wind conditions, a 58 percent wind reduction at the entrance to the roofed over plaza and a 32 percent reduction at the curbside on Market Street. Results of the wind tunnel tests are reported in Appendix C.

Three stories were then added to the high-rise. A new wind tunnel test, which would have been required for accurate pre-

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* Statements in Section VI concerning the developer's commitments or intent are effective as of January 24, 1975.

dictions with the taller building, was not made. But a subjective estimate, also reported in Appendix C, indicated the following. During westerly winds, speeds in the plaza and adjacent sidewalk areas would be increased. Wind speeds would be slightly higher on the roof terraces during south and southeast wind conditions. The impact of the increased height was indicated as probably not very significant at other wind directions.

In the latter part of November 1974, the developer revised the design of the low-rise portion of the proposed new building (as shown in Illustration 2, page 8.) The Environmental Impact Planning Corporation ran a wind tunnel test of the revised design, using a larger-scale project model than had been previously used; surrounding buildings were not included, however. Significant reductions in westerly winds at the plaza level were indicated by the test. Because this test is not documented in Appendix C, the general conclusions are quoted in a footnote below.*

The developer also added walls to the north end of each of the roof terraces on floors 32-35 of the high-rise to reduce the very high winds on the terraces. (See Illustration 3, page 10, for location of terraces). Further assessment with wind analysts would be prudent to determine the optimum characteristics of the walls .

An overhang above the entrance to the high-rise was added in December 1974 to reduce wind turbulence near the building's entrance and keep the high speed wind stream (coming down the westerly side of the high-rise) well above the plaza. See footnote .

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* Results of additional wind research; EIP, November 26, 1974:

"Design modifications made after completion of earlier tests have caused improvements in wind conditions in the entrance plaza during west wind conditions in the entrance plaza during west wind conditions. The modified design of the adjacent 40-foot building results in a reduction of winds by about 70% at the north end of the plaza, gradually declining to about 10% near curbside. The wind reduction at the building entrance is about 50%.

(Footnote continued on next page.)

Off-Street Loading/ Congestion	The first draft of the Draft EIR suggested adding a second entrance to the garage: 1) to reduce congestion generated due to cars and trucks both having to use the one existing entrance to the garage, and 2) to enable a fourth off-street loading space to be provided as required by the Planning Code. This mitigation, which required removing existing retail space at the north side of the garage, was completed by the developer during November 1974. To enable trucks requiring more than 10'3" headroom clearance to use the two interior-most off-street loading spaces, the clearance of the existing garage door would be increased.
Energy Consumption	Mitigation measures have been taken during the design process to conserve energy. The high-rise would have the following characteristics: o Flexible light control system permitting zone control of lights. o Heating/air conditioning units and controls on every floor permitting temperature levels appropriate to needs of each floor.

(Footnote continued from previous page)

"The reason for this reduction is that high speed windflow down the west face of the building, which previously could reach ground level through the narrow gap between the two buildings, is now blocked by the 40-foot building. The high speed winds, which previously blew through the plaza, are now elevated and appear to reach the ground near Market Street.

"Further reductions in windspeeds were found to occur when an overhang above the entrance was added. The most effective overhang was one that extended out from the southwest face over the entire width of the face, and was flush with the top of the 40-foot adjacent structure. This configuration kept the high speed wind stream well above the plaza, and reduced turbulence near the entrance.

"No noticeable increases in windspeed were observed elsewhere near the site due to these modifications."

- Mechanical fan system equipped with an "economizer cycle," which uses 100% cold outside air to cool the building without running the electric chillers and the chilled water plant. This is known as "free cooling cycle."
- Light fixtures used as air handling fixtures. Return air from the space is extracted through the lamp cavity of the fixtures. This air lowers the interior temperature, thereby increasing light efficiency and insuring increased lamp and ballast life.

Solid Waste

The bulk of solid waste generated by the project could be significantly reduced by installation of a trash compactor. Compacted trash is easier to handle than bulk trash, requires less vehicular miles for transport (hence permitting a reduction in pollutant emissions), improves density of sanitary land fill by about 50%, decreases the amount and rate of land consumption, and promotes better appearance at a sanitary landfill. Waste compaction should not limit the potential reclamation of material from solid waste.* (The developer is considering the installation of a trash compactor.)

The City has no policy at this time concerning the installation of a trash compactor in buildings.

Noise

Review of all mechanical and electrical systems would be made during the latter stage of design development to assure that the silencers, proposed by the developer to be installed on all mechanical equipment air intakes and exhausts, would be adequate to prevent a noticeable increase in evening ambient noise conditions.

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* Based on observations from an Environmental Protection Agency demonstration project (the Atlanta Home Compactor Project), EPA stated: "Home Compactors would have little effect on a mechanized recycling process. This of course would not be true with a hand sorting operation . . From the incineration test it is evident that the compacted wastes break up with little difficulty. Therefore, ... wouldn't anticipate any major problems with shredding the bundles. Source separation of course would not be affected other than that the compactor could only be used for one component of refuse." (December 11, 1974 letter of EPA to Dr. Selina Bendix.)

B. ACQUISITION STAGE OF THE PROJECT

Relocation on Project Site

The developer has advised all tenants to be displaced from the project site that they have an option to relocate on the site when the project is completed. The Imperial Savings and Loan Association and See's Candies have indicated their intent to locate within the project.

C. CONSTRUCTION STAGE OF THE PROJECT

Archaeological

No archaeological finds are anticipated. However, if there is any indication of potential archaeological significance during excavation, excavation activity would be stopped until an evaluation can be made by a qualified individual.

Air Quality

It is not known if buildings proposed to be demolished contain sprayed asbestos insulation. If they do, the developer states that he would comply with all safety regulations concerning the removal of such material as currently established by the federal Office of Safety and Health Administration.

Debris from on-site demolition would be wetted down as necessary to prevent pollution of the air by dust and other particles. Excavated dirt is likely to be moist, so it would not need wetting. However, all dirt and building debris would be wetted and covered, if necessary, to prevent air pollution and overflow onto public rights-of-way. City streets and sidewalks adjacent to the project would be cleared of project-generated dirt and debris.

Safety

The developer would fully comply with all construction and safety standards of the Construction Safety Orders (Title 8 of the California Administrative Code), which are administered by the Division of Industrial Safety, California Department of Industrial Relations.

Air Quality/ Traffic Congestion	Pollutant emissions from vehicles are increased when the normal flow of traffic is disrupted. Therefore, to reduce potential generated pollution, the developer would minimize traffic obstructions and deliveries to the project site which might obstruct traffic during peak periods.
Noise	All construction equipment would meet the regulations of the San Francisco Noise Abatement and Control Ordinance No. 274-72, Section 2907 Construction Equipment.
Coordination	The City's Committee for Utility Liaison Construction and Other Projects (CULCOP)would be concerned with coordination of street and utility work. The developer would coordinate activities with the Committee. The Pacific Gas and Electric Company has indicated that it would coordinate its installations within the streets and sidewalk areas with other utilities involved.
Market Street Sidewalk Improvements	The developer would restore all right-of-way improvements to their original, or better, condition during the final months of construction, including the replacement of trees if necessary. To prevent damage to newly-installed materials on the Market Street sidewalk, the developer states that he would remove and temporarily store the sidewalk bricks and light standards.

D. OPERATION STAGE OF THE PROJECT

Air Quality/ Traffic Congestion	Morning traffic congestion on Battery Street generated by slow access to the project garage could be reduced. The number of attendants needed for efficient parking of cars would be available on a daily basis.

*(No page 63.)

VII ALTERNATIVES TO THE PROPOSED PROJECT

A. KNOWN ALTERNATIVES TO THE PROJECT OR TO ITS LOCATION

There are no known major alternatives to the type or location of the project which would feasibly attain the developer's basic objectives. The developer (Continental Development Corporation) wants to construct an office building project in a location of the city, and in accordance with a building program, which would permit an economically feasible project. Continental located and successfully negotiated for the project site; it had no reason to seek out alternative sites which met corporate objectives (see page 5) and basic City objectives for the type and proposed density of land uses.

Building Length

Because the high-rise exceeds allowable bulk regulation, alternative design options are discussed in this section. The building would have to be shortened in the north-south direction by $2\frac{1}{2}$ feet to meet the City Planning Code's 170-foot maximum length dimension. Three major options are available, each of which would have negative implications. 1) Shortening the building at the north property line would create an undesirable and unusable alley between the high-rise and 111 Pine Street. 2) Shortening the building on the Market Street side would increase the building's setback from Market Street -- whereas a project objective is to hold the building as close to Market Street as possible. 3) Shortening the building at its southwest corner (where the 170-foot maximum is exceeded) would create a disproportionate building bay to other bays on the Market Street frontage. None of the impacts discussed in Section IV would be otherwise affected.

B. ALTERNATIVES CAPABLE OF SUBSTANTIALLY REDUCING ADVERSE ENVIRONMENTAL EFFECTS

Provision of additional parking under either the high-rise or plaza could substantially reduce the build-up of competition for available off-street parking in the project vicinity. Note: by City policy, however, no off-street parking is required for any use (other than residential as required) in a C-3 Downtown Office District "in recognition of the compact and congested nature of the downtown area, the accessibility of this area by public transit, and programs for provision of public parking facilities on an organized basis at specific locations." (City Planning Code, SEC. 146 (c).)*

The project is providing parking, although not increasing the area's supply of parking. Provision of more parking, in addition to being more costly, would substantially impede attainment of project objectives, possibly making the project financially infeasible. It also would interfere with the environmental objective of encouraging mass transit.

C. OTHER DESIGN OPTIONS

Implications for Taller High-Rise

The project, as proposed, uses essentially all the building bulk permitted for principal uses and accessory uses on the site by City regulations. If a building taller than the proposed 38-story, 537-foot high-rise were to be built on the site, up to or within the 700-foot height limit, the following would result. Only 6000 square feet for additional stories could be gained from the low-rise. About 51,000 square feet could be

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* Where no off-street parking spaces are required, the Code does permit 15 spaces or seven percent of the total gross floor area of the building or development, whichever is greater, to be used for accessory parking facilities. (Section 116.2. (c)) The project is using the seven percent allowance.

gained from the garage, but most of that floor area would have to be for above-grade* parking within the high-rise. (As proposed in the project, the garage would be an accessory parking use for the high-rise; office/retail space cannot be substituted.) At an average of 20,000 square feet per floor, the aforementioned 57,000 square feet (equivalent to about three floors) would add 42 feet to the high-rise.

Primary impacts of removing both the low-rise and garage from the project, for the purpose of adding height to the high-rise, would be as follows: 1) retail space at grade level would be reduced 28 percent, from 13,500 to 9,800 square feet; 2) the project would gain an additional 15,600 square feet of open space; 3) the project would consist only of a high-rise building and open space with no low-rise design element; and 4) a usable parking structure would be demolished. In addition, more elevators probably would have to be added within the high-rise and rentable office space would be reduced on each floor. (The developer states that the elevator bank system now designed for the 537-foot high-rise is just about at its capacity in height.)

The area of each floor of the proposed high-rise would have to be decreased, if more than three stories were to be added to the high-rise. The developer states that the project would become economically unfeasible due to the additional elevators which would be required and to the inefficient rentable office space/service core ratio on each floor.

Increasing the height of the high-rise would not significantly change the impacts discussed in Section IV, pages 32-53. If the garage were demolished and the low-rise not constructed, there would be less off-site impact on adjacent rights-of-way during the construction stage because there would be more room on-site for construction activities. Changes in wind and discomfort impacts are not estimated.

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* Parking could be below-grade also, but only above-grade parking would add to the height of the building.

Implications for New Garage and/or More Intensive Development on Garage Site

An option could be to replace the existing garage with a new, more efficient parking facility on the same site. In conjunction with construction for a garage, additional office and/or retail space could be provided above the garage, provided a comparable amount of office/retail space were removed from the proposed high-rise. No significant environmental advantages of this option are estimated, however. The developer sees replacement of the garage as an expensive, unnecessary and unwarranted "alternative." And without replacement of the garage, no additional office/retail uses could be reasonably built on the garage site.

Elimination of All Parking

If all parking were eliminated from the project, the parking garage would have to be demolished and the site used for open space or office/retail uses (if comparable space were removed from the high-rise.) This action would remove an existing parking resource from the area's inventory and would tend to further aggravate the shortage of parking which now exists in the area. Off-street loading would have to be provided elsewhere on the project site.

D. ALTERNATIVE OF "NO PROJECT"

If the project were not undertaken, the buildings proposed to be demolished most likely would revert to office and retail uses similar to the ones which previously occupied the buildings. Displacement of the four tenancies still in buildings proposed for demolition would not be necessary.

Analysis of the supply of equivalent, available office and retail space would be necessary to determine how quickly the buildings might be reoccupied. Very slow reoccupancy could have adverse economic and visual impacts on the surrounding area, as well as adverse economic impacts for the building owners. If reoccupancy were rapid, there would be little noticeable environmental impact, but adverse economic impact for the building owners.

Otherwise, the "no project" alternative would eliminate all the adverse and positive impacts generated by the project and described in Section IV.

VIII THE RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF MAN'S ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

The major cumulative and long-term effect of the project is the commitment of the project site to the proposed height/bulk character of the site plan.

It is reasonable to assume that future "alternative actions" for the site also would entail primarily office uses, typical of such downtown locations.

Economic effects of delaying site commitment are not justified because no substantially more environmentally desirable alternative seems to be available.

The present project does not preclude the future possibility of a non-parking use, e.g. open space, on the garage site. (If public acceptance of mass transit should significantly increase in the future, for example, the parking structure might not be needed.)

IX ANY IRREVERSIBLE ENVIRONMENTAL CHANGES WHICH WOULD BE INVOLVED IN THE PROPOSED ACTION SHOULD IT BE IMPLEMENTED

The increased density of office uses and the consequent change in building form from low-rise to primarily high-rise character are the significant irreversible environmental changes which would be involved in the proposed action.

The buildings proposed to be demolished would be nonrenewable material resources.

Construction and operation of the project would also consume nonrenewable energy and material resources. Consumption of energy (documented on pages 49 - 53) would be typical for a project of the type proposed. Mitigation measures for use of energy (pages 59 - 60) would help to minimize use of gas and power resources during project operation.

X GROWTH-INDUCING IMPACT OF THE PROPOSED ACTION

Development of the site as proposed is not anticipated to have any significant short or long-term effect on population growth in the City and County of San Francisco -- even though an estimated net increase of 1700 persons would be employed on the site and an estimated 97,000 man-days of employment with a $10 million payroll would be provided on-site during the construction period. The project would serve both existing populations and some new growth.

Several factors account for the lack of growth-inducing impact on population growth. First, close to 50 percent of new jobs* created in San Francisco, especially in the downtown financial district,tend to be filled by persons residing outside of San Francisco. Neither the number of "new" jobs to be generated by the project nor the number of jobs which would be relocated from other sites in the City are known. However, even if every job would be a "new" job filled by a person who would move to San Francisco, net population increase in the City would be less than one percent. This increase would not be significant from the City or the regional perspective. Second, the construction industry is generally depressed and many project jobs would be filled by the unemployed or persons soon to be available after completion of other projects.

The project would add approximately 697,000 square feet (560,000 net increase for the site) to office space in the financial district. Note: Since 1959, approximately three

* Estimates based on geographic distribution of home-to-work trips, 1980 Bay Area Transportation Study (BATS); Population, Employment and Land Use Projections - S.F. Bay Region: 1970 - 2000 (Summary Series II), Association of Bay Area Governments; and evaluation by Sedway/Cooke of possible growth trends in San Francisco and the Bay Area.

three million square feet of new office space has been built in seven buildings near the project. (See Table 3, page 27.) In addition to the proposed project, four million square feet of office space is now being constructed or designed in six projects near the project. (See Table 4, page 28.) These several office building projects conform to the City's policies on development of the downtown and development of San Francisco as a regional center for the headquarters of financial and other institutions. The completed projects have had a locational influence on the seven projects (including the subject 444 Market Street Project) now being constructed and designed. Collectively, these projects are establishing the "new" office center of the City as an area to which future office buildings will be attracted.

The project would increase demand in the project area for restaurant services, beyond those which may be provided in a ground floor restaurant or coffee shop in the high-rise. Adverse impact is not anticipated either for existing restaurants or those which may be generated by the project.

XI EIR PARTICIPANTS AND CONSULTANTS: ORGANIZATIONS AND PERSONS CONSULTED

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San Francisco Department of City Planning; 100 Larkin Street; San Francisco, California 94102
- o Dr. Selina Bendix, Environmental Review Officer
- o Douglas Holmen, Coordinator

EIR CONSULTANTS; AUTHOR OF PRELIMINARY DRAFT EIR

Sedway/Cooke, Urban and Environmental Planners and Designers; 400 Pacific Avenue, San Francisco, California
- o Thomas Cooke, Partner-in-Charge; Arthur S. Goldman, Project Manager; William K. So; Jack Schnitzius; Pam-Anela Messenger; Walter Rask; Pat Scarlett; Darlene Luppino; Debbie Harrington.

Joseph Coons, Air Quality Consultant to Sedway/Cooke (Cal. Engineer Cert. CH-2583);

Buonaccorsi & Associates; Noise Consultant to Sedway/Cooke
- o Charles Salter (Ca. Mechanical Engineer 16460); Glen Cass

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Project Developer and Consultants

Continental Development Corporation*
- o Henry Barak; Thomas Heavey

Skidmore, Owings & Merrill; Project Architect, Consultant to Continental Development Corporation
- o Richard Ciceri; Allan Rudy (Cal Architect Lic. C-4211); Carl Jordan (Cal. Engineer Lic. M-12343)

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* Organizations and persons with known interest in the project.

Environmental Impact Planning Corporation; Wind Consultant to Skidmore, Owings & Merrill (Wind/Comfort Appendix for EIR)
- o Dr. Edward Arens; Donald Ballanti

Dames & Moore; Civil Engineering Consultant to Skidmore, Owings & Merrill (Soils Appendix for EIR)
- o Edward E. Rinne (Cal. Civil Engineer 15953)

Public Agencies

California, State of

Solid Waste Management Board
- o Lawrence A. Burch, Supervising Engineer

Department of Health, Water Sanitation Section, Vector Control
- o Dr. David Storm

Water Resources Control Board
- o Norman Rial

City and County of San Francisco

Assessor's Office

City Planning Department
- o Charna Statten, Transportation Planner; Russell Watson, Project Review; Edward Michael, Secretary to the Landmarks Advisory Board

Fire Department
- o Rene A. Gautier, Chief, Division of Planning and Research

Municipal Railway
- o William Dorais, Environmental Coordinator, Transit Improvement Program

Police Department
- o George Sully, Captain, Commanding Officer, Planning and Research Bureau; Robert Bernardini, Planning and Research Bureau

Public Works Department
- Richard Evans, Traffic Engineer, Traffic Engineering Division; Robert C. Levy, City Engineer, Bureau of Engineering; Louis Vagadori, Sanitarian Engineer, Division of Sanitarian Engineering; Mr. Warda, Building Inspector, Bureau of Building Inspection; Ernest Tasorio, Street Cleaning Division

Water Department
- John E. Kenck, Assistant Manager, City Distribution Division

Others

Golden Gate Transit

San Francisco Bay Area Rapid Transit District
- Ward D. Belding, Senior Analyst

San Francisco Community College District
- Mr. Kimble, Business Office

San Francisco Unified School District
- Peter Tom, Accounting Office

Building Owners Association
- Elmer Johnson

Cleveland Wrecking Company
- Mr. Wenters

Coldwell/Banker & Company
- Peter Musto; James MacDonald

Golden Gate Disposal Company
- Inez Bini; Leo Conte

Pacific Gas and Electric Company
- Ted A. Hester, Industrial Power Engineer

Pacific Telephone & Telegraph Company
- R.F. Richard, Engineer, Building Industry Consultant

Swinerton & Walberg Company
- Joseph Singer

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ENVIRONMENTAL IMPACT REPORT
444 MARKET STREET PROJECT
SAN FRANCISCO, CALIFORNIA

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APPENDIX

APPENDIX A CIRCULATION/TRANSPORTATION

Contents | Page

This Appendix was prepared by Sedway/Cooke, Urban and Environmental Planners and Designers, San Francisco, California.

APPENDIX A CIRCULATION/TRANSPORTATION

A. CIRCULATION/TRANSPORTATION SETTING

General Location

The project site is in the heart of the financial district. It is within easy walking distance (six blocks) from the City's retail center at Union Square, has excellent transit access, and is within two blocks of direct freeway access.

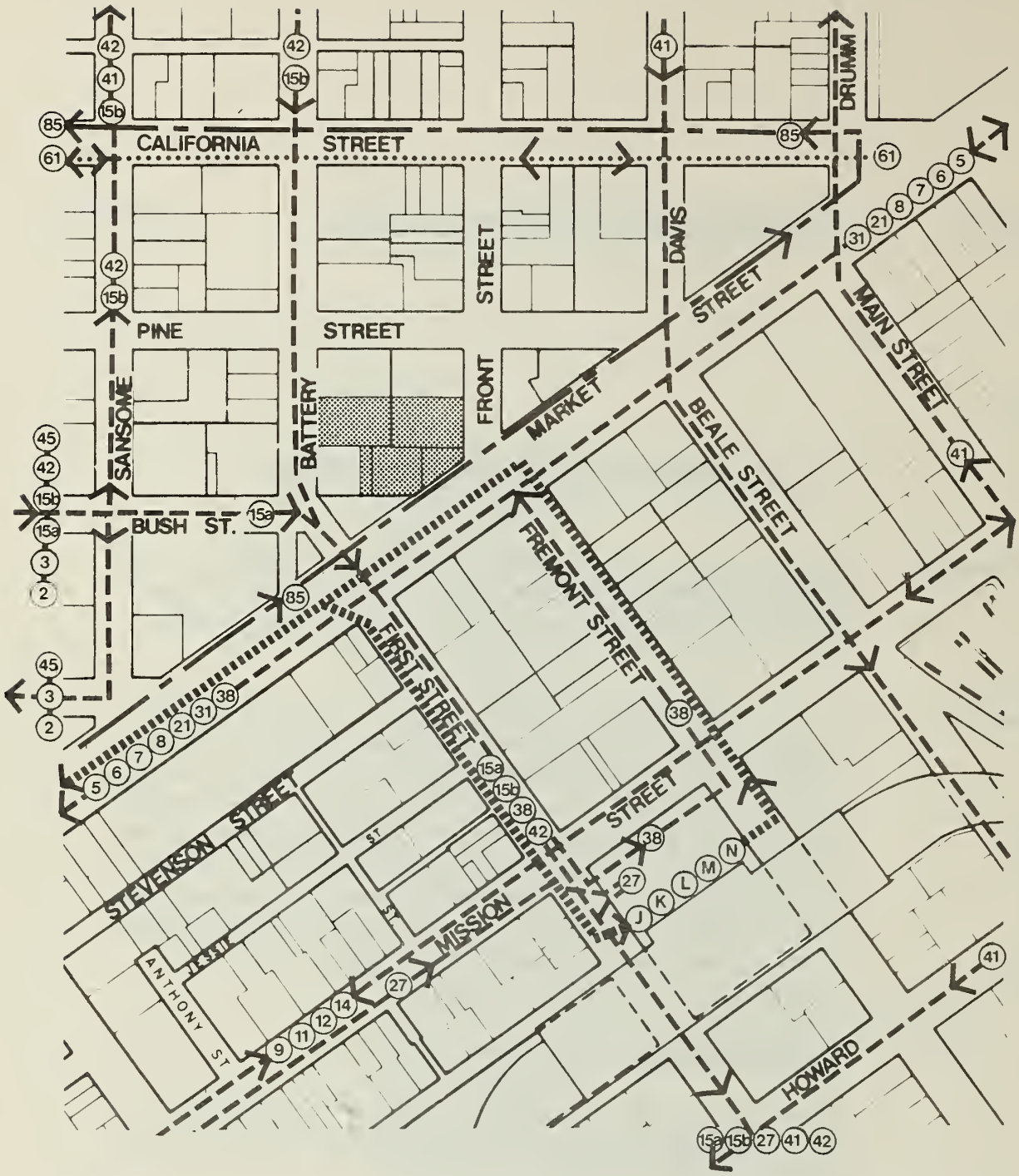
Mass Transit

The site is directly adjacent to or within convenient walking distance (two to six blocks) of major transit lines and terminals. Commuters are served as follows: from all parts of San Francisco by the San Francisco Municipal Railway (Muni); from the East Bay area by the Bay Area Rapid Transit District (BART) and the AC Transit District; from the North Bay area by the Golden Gate Transit District buses and ferries; and from the South Bay area by BART (via Daly City) and the Southern Pacific Railroad. The Greyhound Bus Line serves North, East and South Bay communities.

Municipal Railway (Illustration A1, page A-3)

Several Muni lines service the site, with most of the lines operating on Market Street or crossing Market Street within one block of the project site.

Some of the five streetcar lines (J, K, L, M and N) on Market Street are scheduled to begin operating in the new Muni subway under Market Street by the end of 1975. All Market Street streetcar lines will be operating in the new subway by 1977. Muni has estimated the capacity of its subway system at 15,000 passengers per hour, compared to the 7,800 passenger-per-hour capacity of the existing street car lines.



MUNI

Illustration A1

- 5 — Coach Lines
- 85 — Shopper Shuttle Route
- N — Street Car Routes (Will go in Subway)
- 61 — Cable Car

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0 100' 200'

NORTH

Muni service in the area thus will soon be entering a transitional stage because of the new subway.

BART (Illustration A2, page A-5)

The project site is between and immediately accessible to the existing Montgomery Station (with entry at the corner of Sansome and Market Streets) and the future Embarcadero Station. Hours of BART operation (weekdays only, stopping at 8 PM) will be extended when the Richmond/Daly City line goes into operation. According to BART, this new operation is under study, with options between May and July 1975 being investigated.

Golden Gate Transit (Illustration A2, page A-5)

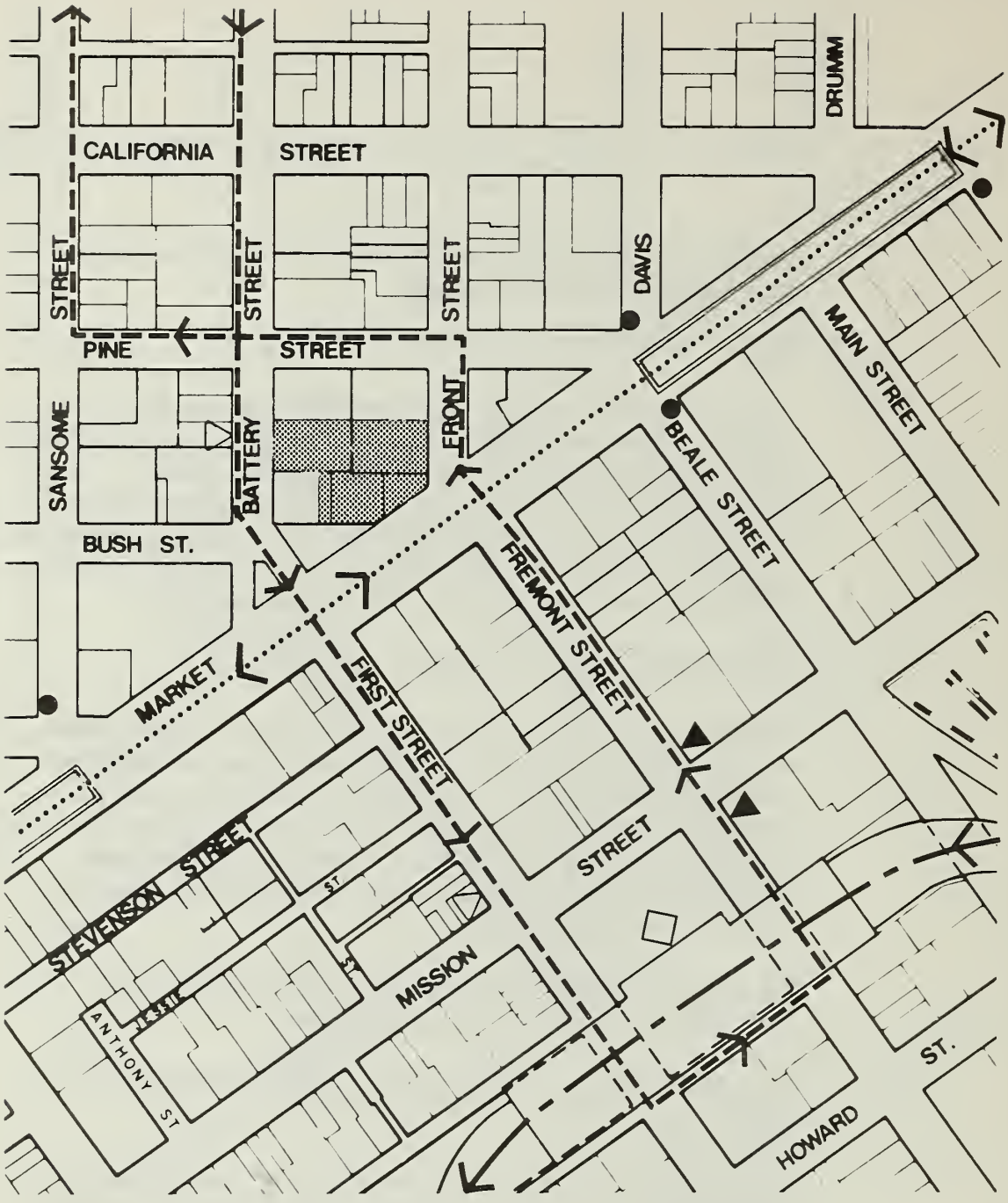
The Financial District circuit of the GGT bus service includes 24 lines which operate on three of the four streets in the block containing the project. Front and Pine Streets are used by outbound buses; Battery Street by inbound buses. Bus stops are within one block of the site. Service is now available only during the morning and evening commute hours, approximately 7-9 AM and 4-6 PM.

The Ferry Building, six blocks distant, is the terminal for ferries of the Golden Gate Transit District.

AC Transit, Greyhound and Southern Pacific (Illustration A2, page A-5)

AC Transit transbay service is available one block from project at the Trans Bay Terminal at Mission and First Streets. Scheduling and routing are in transitional stages because of the competitive service just opened by BART. The Greyhound Bus provides transit access to the site with a stop at the Trans Bay Terminal.

SP service is from the depot at Third and Townsend Streets, with Muni transfer available at the depot. If authorized, the current SP request for more than a 100 percent increase in commuter fares could affect patronage from South Bay communities.



BART/AC TRANSIT/ GG TRANSIT/GREYHOUND

Illustration A2

BART

- Line
- Station
- Access

GG Transit

- Route (Involves 24 Lines)
- Discharge Stop
- Boarding Stop

AC Transit and Greyhound

- AC Transit Lines
- AC Transit Terminal, Greyhound Stop

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0 200' 400'

NORTH

Transit Preferential Streets (Illustration A3, page A-7)

The City's Plan for Transportation designates all streets adjacent to and most streets near the project as "transit preferential streets", i.e. streets which are designated for transit operations with minimum interference by other traffic.

Vehicular Circulation

Right-of-Way Characteristics (Table A1, page A-8)

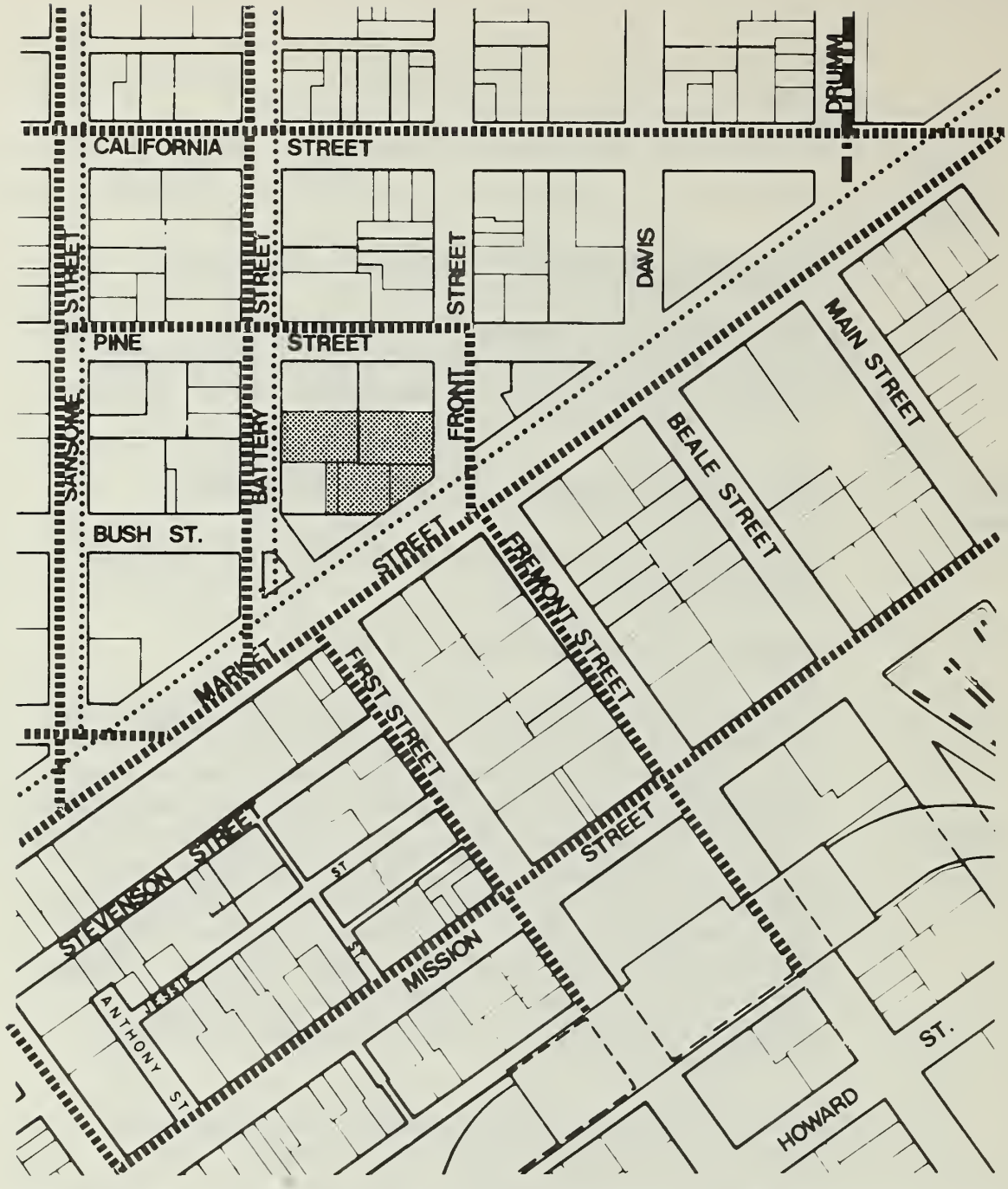
The characteristics of rights-of-way adjacent to the project are shown on Table A1.

Existing Traffic Volume (Table A2, page A-9)

Availability of traffic counts by the City near the project area is limited. Because of the extensive and lengthly construction operations which have greatly restricted traffic flow, no counts are available and none are projected by the Department of Public Works for Market Street. Note: The Department believes that Market Street will not become heavily trafficked even after complete reconstruction, because Mission and Pine Streets will have more favorable flow characteristics. On Market Street there will be only two travel lanes in each direction, with no parking or stopping lanes. Although there are turnouts for loading purposes, buses will stop in the outside travel lane in each direction.

The only recent vehicle counts (taken by the Department of Public Works during 1969-1973) are as follows:

1. 24-hour volumes (vehicles)
   - Bush Street heading east, between Montgomery and Sansome: 12,465
   - Battery Street heading south, between Pacific and Jackson: 12,501
   - Front Street heading north, between California and Sacramento: 3303
   - First Street heading south, between Mission and Howard: 11,615
   - Fremont Street heading north, between Mission and Howard: 8076



TRANSIT PREFERENTIAL STREETS AND BICYCLE ROUTES

Illustration A3

Existing/Proposed Transit Preferential Streets

Existing/Proposed Bicycle Routes

Streets to be Improved as Bicycle Routes

Source: San Francisco Department of City Planning, The Plan for Transportation, 1972.

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0 100' 200'

NORTH

Table A1

RIGHT-OF-WAY CHARACTERISTICS ADJACENT TO PROJECT

	Market Street	Front Street	Pine Street	Battery Street
Direction of Travel	two-way	one-way north	one-way west	one-way south
Right-of-Way Width	120'	68' 9"	68' 9"	68' 9"
Curb to Curb Width	76' (50')[a]	45' 10"	38' 9"	45' 9"
Travel Lanes	4	2	2	3
Parking/Loading Lanes	0	2	2	2
Sidewalks	2 @ 22' (35')[a]	2 @ 11' 5½"	2 @ 15'	2 @ 11' 6"
Loading Zone Cut-Out	1 (10' x 70')	0	0	0
Peak Hour Tow-Away	N. A.	yes	yes	yes
Estimated Peak Hour Capacity[c]	1000 vph[b]	2300 vph	1600 vph	620 vph

(a) Figure in parentheses is final plan to which Market Street is being constructed.

(b) vph = vehicles per hour; Market Street figure assumes elimination of streetcar turning conflicts after start of Muni Metro service.

(c) Estimated using a nomographic procedure derived by Jack E. Leisch from the Highway Capacity Manual (Highway Research Board, 1965). Inputs to nomographs were data on traffic direction; parking; right-of-way width; trucks and buses as percentages of total traffic; percentages of right and left turns; metropolitan area size; and the ratio of green time to signal cycle time.

Table A2

EXISTING TRAFFIC VOLUMES ADJACENT TO PROJECT
(Vehicles)[a]

	Market Street	Front Street	Pine Street	Battery Street
24-hour Volume: Total	NA	5,500	5,000	12,000
- GGT	0	160	160	160
- Muni	2210	0	0	260
AM Peak[b]: Total	NA	930 (500)	780 (450)	1660 (960)
- GGT	0	0	0	
- Muni	590 (220)	0	0	130 (60)
PM Peak[c]: Total	NA	760 (440)	740 (400)	2000 (1080)
- GGT	0	160 (80)	160 (80)	0
- Muni	370 (140)	0	0	90 (40)

(a) Peak hour shown in parentheses after peak period.

(b) Peak period = 8% of 24-hour volume. Peak hour = 58% of AM peak period.

(c) Peak period = 9% of 24-hour volume. Peak hour = 54% of PM peak period.

2. PM peak hour volumes (vehicles)
   - First Street heading south, between Market and Mission: 1070
   - Fremont Street heading north, between Market and Mission: 686

In these traffic counts taken by the City generally at the same locations in 1951, 1964, 1967 and 1970, traffic volumes fluctuated within a range of plus or minus ten percent. 1967 has the highest volumes, 1951 the lowest.

Based on the above traffic counts, 24-hour volumes adjacent to the project block are estimated by Sedway/Cooke at 12,000 vehicles on Battery Street; 5,500 vehicles on Front Street; and 5,000 vehicles on Pine Street. These estimates, plus estimates of AM/PM peak hours and flow of Muni and Golden Gate Transit vehicles are shown on Table A2, page A-9 .

Sedway/Cooke's field observations indicate that the heaviest turning movement in the project vicinity is for vehicles turning west onto Pine Street from Front Street, especially during the PM peak. Golden Gate Transit buses are a major element of this PM peak turning movement -- 1.3 buses per minute between 4-6 PM.

Parking (On and Off-Street) (Illustration A4, page A-11)

On-street parking in the project area is very limited. Within the area shown on Illustration A4, there are approximately 100 metered parking spaces. All meters limit parking to thirty minutes and spaces are always occupied. Parking is prohibited during some portions of the day on every street, with the exception of the east side of Sansome Street between Market and Bush Streets. There will be no parking at any time of day on Market when construction is completed on that street. Peak hour "tow-away" near the project area on Front Street, Pine Street and portions of Battery Street helps to ease the flow of commuter traffic.

Approximately 1800 off-street parking spaces are available near the project site -- 1500 in garages and 300 in open parking lots, according to a survey by Sedway/Cooke during September 1974.

ON- AND OFF-STREET PARKING

Illustration A4

- Parking Lot
- Parking Garage
- (200) Number of Parking Spaces in Lot or Garage
- (3) Number of 30-minute Parking Meters Along Street
- Peak Hour or Loading Zone Parking Restrictions

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SAN FRANCISCO, CALIFORNIA

0 100' 200'

NORTH

Approximately 3250 vehicles can be served in these off-street spaces if it is assumed that: 50 percent of the spaces are used by all-day parkers; 30 percent serve three cars per working day and 20 percent serve two cars per working day. (This percentage of use breakdown is based on general conditions of use at the existing parking garage on the project site.) During recent informal discussions, among staff of Sedway/Cooke and operators of the nearby lots and garages, the operators generally stated that occupancy of facilities ranged from "full" to "nearly full" every weekday.

The City's 1965 Downtown Parking and Transportation Survey shows a 1965 and a projected 1975 parking space deficiency for the area generally within one block of the project.

Loading Zones and Facilities (On and Off-Street)

Yellow (loading) zones and metered spaces limited to trucks from 9 AM - 1 PM provide eighteen spaces on Front, Market and Battery Streets in Assessor's Block 266. There are no spaces on Pine Street. These spaces should provide short-term parking for deliveries, loading and unloading. However, both the 1965 Downtown Parking and Transportation Survey and recent field observations by Sedway/Cooke indicate extensive illegal parking in these spaces by autos and other non-commercial vehicles. This practice requires many delivery vehicles to illegally double park and consequently increase traffic congestion.

Most new office buildings in the vicinity have "designated" freight loading/unloading spaces in their respective parking garages. Most of these spaces have easy access to and from the street and have adequate inside maneuvering room.

Sedway/Cooke's field observations indicate, however, that: 1) cars are parked in the off-street loading spaces of some buildings and 2) most loading and unloading activity servicing high-rise buildings in the area takes place from curbside or from vehicles that are illegally double parked. Service vehicles were using the available off-street loading facilities of only two of twelve buildings which were surveyed. Eleven of the twelve buildings were receiving deliveries from streetside.

Pedestrian Circulation & Bicycle Routes

There is extensive pedestrian circulation near the project area, especially during the AM and PM peak periods and during the 12-2 PM lunch period. These movements do not strain existing sidewalk capacities. An objective of the City's Comprehensive Plan is increased pedestrian activity on Market Street.

Existing and proposed bicycle routes are designated by the City's Transportation Element of the Comprehensive Plan for all streets adjacent to the project site. (Illustration A3, page A-7 .)

B. EXISTING PROJECT SITE

Parking Garage

The only existing on-site parking is the 221 spaces in the existing three-story parking garage on Battery Street (Parcel 7). Spaces are in five levels: basement, 56; first floor, 22; second floor, 45; third floor, 45; and roof, 53. Of the 22 spaces on the first floor, 12 are in the area used extensively for cars belonging to Avis Car Rental. The Avis office, within the garage, has direct pedestrian entrance from Battery Street.

Compared to newer parking garages at which drivers park their own cars, attendant parking at this facility tends to be slower--causing backup sometimes on Battery Street during the AM peak period especially if insufficient attendants are working. Characteristics of the garage (narrow 7'2" wide stall widths, only one up/down ramp for vehicles, and no stairs or ramp for pedestrian circulation throughout the garage) require that cars must be parked by attendants.

Overhead clearance for entry to the garage is 10'3", although with modification to the door and some ducts, clearance could be increased to about 16', thereby permitting higher trucks to use the garage.

The garage is now used to about 75 percent of its capacity -- at a time when the buildings on Parcels 2 and 3 are nearly totally vacated. About 100 spaces are used for all-day parking, and the remainder for short-term parking. (Occupancy was five to ten percent higher, generally with more all-day parking, during the AC Transit strike from July 1 to August 31, 1974.)

Parking-Related Congestion	Cars waiting to enter the garage during the morning peak period block the easterly of the three travel lanes on Battery Street two to three days a week. The backup occurs mostly between 8:15-8:45 AM and sometimes between 9:00-9:30 AM; for brief periods it extends around the corner for a few car spaces along Pine Street. The waiting cars require moving vehicles to shift lanes, but they do not otherwise inhibit the flow of traffic on Pine and Battery Streets.
Off-Street Loading	There are no off-street loading spaces on the site.
Other Factors	Discussion of parking demand, vehicular trips, person trips and modal splits (for both the existing site and proposed development) is included in Section D, "Impacts of the Proposed Project".

C. PROPOSED PROJECT DEVELOPMENT

Off-Street Parking	Existing parking in the garage would be reduced from 221 to 209 spaces by the project. The garage would continue to be operated as a commercial facility for general parking although preference for monthly commuter and business parking most likely would be given to tenants of the proposed project.
On-Street Parking & Loading	The developer does not propose any changes to the character of on-street parking and loading on the Front Street and Market Street frontages adjacent to the project.

D. IMPACTS OF THE PROPOSED PROJECT

Several circulation/transportation impacts would result from the onsite increases in building area (from approximately 212,000 to 769,000 square feet) and employment (from approximately 350 to 2050 persons).

Construction Period	The construction period is now estimated by the developer to begin in late December 1974 or early 1975 and extend through April 1977. During that period, construction activities would require closing the parking/loading lane on the westerly side

of Front Street. This would impact traffic flow, especially during the PM peak period when the lane is used for the left turning movement from Front Street onto Pine Street. It also would close four loading spaces which are used to service businesses on both sides of Front Street.

During the brief periods to be programmed by the developer with the Public Works, Police and Fire Departments, an additional lane on Front Street might have to be closed to accommodate delivery of heavy materials. This would have an additional impact on traffic flow on Front Street.

The three-space loading zone turnout on Market Street would be closed; that action probably would only affect deliveries to the property at the corner of Battery and Market Streets.

Sidewalks adjacent to the project site on Market Street and Front Street would be closed. Pedestrian movements would be slightly impeded, but access would be provided by the developer through temporary covered walkways, in full compliance with City regulations.

Person-Trips, Modal Split, & Pedestrian Circulation

The project would generate about 17,300 person-trips per working day -- an increase to the site of about 14,000. Modal split of these trips would be approximately 2800 by walking, 8900 by auto and 5600 by transit. (Tables A3 and A4, pages A-16 to A-18).

Increased pedestrian circulation would intensify pedestrian activity on Market Street - an objective sought by the City's improvements to Market Street.

Nontransit Vehicle Trips

Nontransit vehicle trips generated by the site will increase from 1,200 to 6,400. Because there is no increase in on-site parking spaces, the impact of most (6100) of the projected 6,400 trips will be dispersed throughout the general neighborhood of the project. Approximately 330 vehicle trips per day for service purposes must be accommodated adjacent to or within the project. (Table A5, page A-19.)

Parking Demands

The project will increase work/business parking demand generated by the site from approximately 230 to 1010 spaces. (Table A6, page A-20.)

Table A3

PURPOSE, ORIGIN AND MODAL SPLIT OF PERSON TRIPS GENERATED BY EXISTING SITE DEVELOPMENT[a]

(Person Trips Per Day)

Trip Purpose	Trip Generation Ratio	Person Trips Generated	Origin Distribution[b]		Modal Split[c] Walk	Auto	Transit
Work[d]	2/employee (less 5% absence rate)	674	SF	390	14	188	188
			EB	120	-	66	54
			NB	48	-	36	12
			SB	116	-	72	44
Business[e]	6/office employee	1800	SF(D'town)	720	216	360	144
			SF	778	78	420	280
			EB	140	-	120	20
			NB	32	-	24	8
			SB	130	-	104	26
Shopping[f]	10/retail employee	550	SF(D'town)	412	330	-	82
			SF	100	10	54	36
			EB	18	-	16	2
			NB	4	-	4	-
			SB	16	-	12	4
Service: office	.1/office employee	30	SF	30	-	30	-
retail	2/retail employee	110	SF	110	-	110	-
TOTAL		3164		3164	648	1616	900

(a)-(f) Footnotes for Table A3 and Table A4 located after Table A4 .

Table A4

PURPOSE, ORIGIN AND MODAL SPLIT OF PERSON TRIPS GENERATED BY PROPOSED PROJECT[a]

(Person Trips Per Day)

Trip Purpose	Trip Generation Ratio	Person Trips Generated	Origin Distribution[b]		Modal Split[c] Walk	Auto	Transit
Work[d]	2/employee (less 5% absence rate)	3772	SF	2188	76	1056	1056
			EB	678	-	372	306
			NB	264	-	198	66
			SB	642	-	398	244
Business[e]	6/office employee	11,910	SF(D'town)	4764	1430	1906	1428
			SF	5146	514	2780	1852
			EB	928	-	788	140
			NB	214	-	160	54
			SB	858	-	686	172
Shopping	15/retail employee	1290	SF(D'town)	968	774	-	194
			SF	232	24	124	84
			EB	42	-	36	6
			NB	10	-	8	2
			SB	38	-	30	8
Service: office	.1/office employee	190	SF	190	-	190	-
retail	2/retail employee	172	SF	172	-	172	-
TOTAL		17,334		17,334	2818	8904	5612

(a)-(f): Footnotes on following page.

Footnotes for Tables A3 and Tables A4:

(a) Based on occupancy before vacation of major buildings.

(b) SF D'town (Downtown San Francisco); EB (East Bay); NB (North Bay); SB (South Bay).

(c) Based on percentage data provided by Planning Department in August 1974. Original source: 1965 Bay Area Transportation Study and 1970 Census "journey to work" data.

(d) 100% of workers enter and exit during AM and PM peak periods.

(e) 40% of business trips by workers in downtown SF. Of these, for the "present site development"; 30% walk, 50% use auto and 20% use transit. For "proposed project"; these figures are 30%, 40% and 30% respectively.

(f) 75% of all shopping trips by workers in downtown SF. Of these, 80% walk, none use auto and 20% use transit. 80% of shopping trips expected during 12-2 PM; others distributed throughout the day.

Table A5

VEHICLE TRIP GENERATION (NON-TRANSIT VEHICLES ONLY)
EXISTING DEVELOPMENT AND PROPOSED PROJECT

(Vehicle Trips Per Day)

Trip Purpose	Generated by Existing Site Development[a]		Generated by Proposed Site Development	
	Person Trips[b]	Vehicle Trips[c]	Person Trips[b]	Vehicle Trips[c]
Work/Non-Work				
Work	362	258	2,024	1,446
Non-Work[d]	1,114	796	6,518	4,656
(Subtotal)	(1,476)	(1,054)	(8,542)	(6,102)
Service				
Office	30	28	19	173
Retail	110	100	172	156
(Subtotal)	(140)	(128)	(362)	(329)
TOTAL	1,616	1,182	8,906	6,431

(a) Based on occupancy before businesses vacated major buildings.
(b) Assumptions: 1) home-to-work trips involve 2 person trips per employee for commercial uses, less 5% absentee rate; 2) shopping trips involve 10 person trips per existing retail employee and 16 person trips for project retail employee; 3) business trips involve 6 person trips per office employee; 4) office trips involve 0.1 person trips per office employee; 5) retail service trips involve 2 person trips per retail employee.
(c) Derived from person trips computed as per footnote (b), assuming 1.4 persons per auto for home-to-work, shopping and business trips, and 1.1 persons per auto for service trips.
(d) Trips other than home-to-work trips. Include shopping and business trips.

Table A6

DEMAND GENERATED FOR PARKING AND SERVICE SPACES
EXISTING DEVELOPMENT AND PROPOSED PROJECT
(Spaces Per Day)

Trip Purpose	Spaces/Area Demand Ratio[a]	Demand Generated by Existing Site Development[b] (Spaces)	Demand Generated by Proposed Site Development[c] (Spaces)
Work/Business	1.4 spaces/1000 sq. ft.	227	1007
TOTAL DEMAND FOR OFF-STREET PARKING		227	1007
Sales and Service	7.1 spaces/100,000 sq. ft.	12	51
Freight Loading and Unloading	12.0 spaces/100,000 sq. ft.	20	86
TOTAL DEMAND FOR ON-STREET & OFF-STREET SERVICE SPACES		32	137

(a) Ratios established with San Francisco Traffic Engineer's office.
(b) Based on occupancy before vacation of major buildings. Building area of 162,400 square feet.
(c) Building area of 719,200 square feet.

The existing parking garage is now filled each day to an average of 75-80 percent of capacity--with buildings on Parcels 2 and 3 essentially vacant. Sedway/Cooke estimates that the garage would be filled to an average of 95% capacity after the project is completed, and would serve only 60 cars per day more than at present. (Based on present use characteristics of the garage: 50 percent all-day parkers; of the remaining spaces, 60 percent turnover three times daily; 40 percent turnover twice daily.)

If more spaces are to be available for occupants of the proposed project, then persons now parking in the garage would be displaced.

Other impacts, regardless of who parks in the existing garage, would be increased competition for existing off-street parking in the general neighborhood of the proposed project, and a net reduction of nine off-street parking spaces which now serve the site and the surrounding area.

Service/Loading

The proposed project would generate 320-340 nontransit vehicle trips per day for sales, service, and freight loading/unloading. (Tables A5 and A6, pp. A-19, A-20). The 160-170 vehicles involved would use both existing on-street spaces and the four proposed off-street spaces. (See Illustration 2, page 8 for location of the project's loading area.)

If existing practice of vehicles servicing similar office buildings in the area is an indication, then most of the servicing would occur from legally parked or illegally double-parked vehicles at streetside unless: 1) off-street loading is relatively easy and convenient; and 2) parking regulations are rigidly enforced by the San Francisco police.

The convenice and accessibility of the connection between the highrise building and garage will affect relative use of the garage loading area. (The connection is not designed at this time.)

Use of the garage loading area would be limited to vans and trucks less than 24-25 feet long, which need no more than 10'3" overhead clearance. This clearance limitation would

not affect most service vehicles, which tend to be vans or van-type trucks; it would prevent the relatively few semi-trailers and larger trucks servicing the project from using the loading area.

Peak Period Nontransit Vehicles

Existing development on the project site now generates an estimated 210 nontransit vehicles during the AM peak period; 260 during the PM peak period. The project would generate approximately 1140 and 1440 nontransit vehicles, respectively, during the AM and PM peak periods. (Table A7, page A-23.)

Vehicular Circulation

Accommodation of both automobile parking and off-street loading within the project garage would cause additional congestion both on Battery Street and within the garage (due to limitations on space for truck maneuvering and automobile arrivals on the first floor.) This congestion would aggravate the existing backup on Battery Street which occurs two to three days per week during the morning peak period.

Access to the loading area in the garage would be difficult for service vehicles during the morning peak period. Rather than face congestion within the garage or wait to gain entry to the garage, drivers might be prompted to park illegally on the street, therefore causing on-street congestion adjacent to the site.

Trucks longer than 20-22 feet most likely would have to back into the garage from Battery Street, or back onto Battery Street from the garage, because of limited maneuvering space within the garage. Either action would impede circulation on Battery Street for the time required for a truck to enter or leave the garage.

Transit Person Trips & Distribution

The proposed project would generate a site-related increase from the existing 900 to 5600 transit person trips per day. The trips are 30 percent for home-to-work purposes, 70 percent for nonwork (shopping and business). Percentage distribution of origins and destinations for total home-to-work/nonwork trips, home-to-work trips, and nonwork trips, respectively, would be as follows: San Francisco - 82%, 63%, 90%; East Bay - 8%, 18%, 4%; North Bay - 2%, 4%, 1%; and South Bay - 8%, 15%, 5%. (Table A8, page A-24.)

Table A7

NONTRANSIT VEHICLES DURING PEAK PERIOD AND PEAK HOUR
GENERATED BY EXISTING DEVELOPMENT AND PROPOSED PROJECT

(Vehicles Per Day)

Trip Purpose	Generated by Existing Site Development[a]				Generated by Proposed Project			
	AM Peak[b]		PM Peak[c]		AM Peak		PM Peak	
	Period	Hour	Period	Hour	Period	Hour	Period	Hour
Home-to-Work[d]	129	75	129	770	723	419	723	390
Business[e]	57	30	113	57	339	181	677	339
Shopping[f]	2	-	8	5	4	-	18	11
Service[g]	19	10	6	4	74	37	26	16
TOTAL	207	115	256	136	1140	637	1444	756

(a) Based on occupancy before vacation of major buildings.
(b) AM peak period: 7-9 AM; peak hour: 7:30-8:30 AM.
(c) PM peak period: 4-6PM; peak hour: 4:30-5:30 PM.
(d) Assumptions: All home-to-work trips enter and exit during the AM and PM peak periods, respectively. 58% of AM and 54% of PM peak period traffic occurs during the respective peak hour.
(e) Assumptions: 15% (8% peak hour) and 30% (15% peak hour) of all business trips occur during the AM and PM peak periods, respectively.
(f) Assumptions: 5% of shopping trips occur during the AM peak period, none in the AM peak hour. 25% occur in the PM peak period, 15% in the PM peak hour.
(g) Assumptions: 30% of service trips occur during the AM peak period, 15% during the AM peak hour. 10% occur during the PM peak period, 7% during the PM peak hour.

Table A8

TRANSIT PERSON TRIPS
GENERATED BY EXISTING DEVELOPMENT AND PROPOSED PROJECT
(Transit Person Trips Per Day)

Origin/Destination Area	Generated by Existing Site Development[a][f]			Generated by Proposed Site Development[f]		
	Work	Non-work	Total	Work	Non-work	Total
San Francisco[b]	188	542	730	1056	3558	4614
East Bay[c]	54	22	76	306	146	452
North Bay[d]	12	8	20	66	56	122
South Bay[e]	44	30	74	244	180	424
TOTAL	298	602	900	1672	3940	5612

(a) Based on occupancy before vacation of major buildings
(b) Service by Muni and BART
(c) Service by AC Transit, BART and Greyhound
(d) Service by GGT (bus and ferry) and Greyhound
(e) Service by Southern Pacific Railroad and Greyhound
(f) See Tables A3 and A4. Portions (%) of total trips designated as transit person trips are the same for "existing" and "proposed" site development.

Based on discussion with BART and Muni staff, the additional patronage estimated to be generated by the project would not have a negative impact on the services or facilities of BART or Muni. (4600 of the estimated 5600 transit person trips generated by the project would have an origin/destination area in San Francisco; these patrons would be using BART and Muni.) According to BART staff, patronage capacity of the BART system, not known at this time, is highly variable due to many factors including: level of service (number of cars in trains, scheduled headways), traffic flow conditions, speed, traffic control devices, patrons' tolerance level and patrons' interference. Muni staff indicates that the new Muni Metro subway facilities -- with their doubled patronage capacity by 1975 over existing streetcar lines -- will accommodate patronage generated by the project.

Because of the low additional patronage estimated to be generated by the project for AC Transit, Golden Gate Transit, Greyhound and Southern Pacific, these carriers were not contacted. Sedway/Cooke estimates that the project would not impact those transit systems.

E. MITIGATION MEASURES

The following measures would mitigate some of the adverse circulation/transportation impacts of the project. Parenthetical statements indicate responses by the developer since these mitigation measures were raised by Sedway/Cooke during preparation of the EIR.

Project Design Stage

1. Assure a convenient and adequate connection of the garage loading area to the service area of the high-rise building, even if modification is required to the first floor lubrication service area or ramp between the first floor and basement of the garage. (The connection has not been designed, but the developer will modify the lubrication service area or ramp if necessary.

2. Consider eliminating the present Avis office and the office above Avis in the garage to provide additional access space and temporary "holding zone" at the garage entrance. Alternatively, the space could be used to enable larger trucks to be accommodated within the garage. (The developer will eliminate the existing Avis facilities and use the area for off-street loading).

3. Raise the clearance of the garage entrance door if vehicles needing more than 10' headroom will be servicing project tenants. (The developer will provide more headroom both at the existing garage door and at the area of the garage now used by Avis.)

4. Provide bicycle facilities in the garage to encourage their use in place of automobiles. (The developer will comply.)

Construction Period

5. During the construction period assure good coordination and programming of deliveries to assure the least possible interference with traffic flow near the site. Limit deliveries of heavy and bulky materials especially to off-peak hours. (The developer will comply.)

6. Remove and temporarily store all newly installed improvements on the Market Street sidewalk, such as bricks and light standards, which can be so removed and stored to prevent damage. Replace all materials in public rights-of-way, including street trees, to their original or improved condition during the final stages of construction. (The developer will comply.)

Project Operation Stage

7. Assure that there will be sufficient attendants in the garage during the morning peak period to either eliminate or reduce the backup which occurs on Battery Street. This can be addressed in the lease for operation of the garage. (The developer will comply.)

8. Encourage project tenants to minimize service and freight handling during peak periods, especially if the vehicles will use the garage loading area. This can be discussed with tenants during lease negotiations, with reminders sent at random intervals. (The developer will comply.)

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APPENDIX B AIR QUALITY

Contents

This Appendix was prepared for Sedway/Cooke by Joseph D. Coons, Consulting Engineer, San Raphael, California.

AIR QUALITY IMPACTS

Proposed Office Building
444 Market Street
San Francisco, California

EXISTING ENVIRONMENT

General Climatology

The volume of air moving through the Bay Area is frequently reduced by a combination of meteorological factors. Accumulation of air contaminants under this reduced ventilation produces elevated concentrations. In the bright sunlight often found in such cases, photochemical oxidants (smog) may be formed in the air by reactions among the contaminants. Nitrogen oxides and organic compounds are the contaminants chiefly involved in such atmospheric reactions.

San Francisco receives relatively clean ocean air, under the frequent westerly or northwesterly winds, and its topography is relatively open to any air movement. It thus has better air quality, generally, than many other Bay Area locations, despite its substantial levels of contaminant-generating activities.

Air Quality Levels

The Bay Area Air Pollution Control District (BAAPCD) has operated air sampling stations in San Francisco for many years. The State Air Resources Board (ARB) publishes summaries of these data on a quarterly basis. The data provide a good record of the air quality levels at the sampling site (near Ellis Street and Van Ness), and are the best guide to air quality levels for San Francisco generally. No historical data exist for the site itself.

Examination of the ARB summaries of BAAPCD data for San Francisco, for 1973, disclosed the following:

Carbon monoxide levels (one-hour samples) were 17 parts per million parts of air (ppm) at the maximum. This is well below the State and Federal standards, which are (respectively) 40 ppm and 35 ppm. The mean of the daily high-hour values for the year was about 5 ppm.

Nitrogen dioxide levels (one-hour samples) were 0.21 ppm maximum, and thus below the State standard of 0.25 ppm. The annual average of daily high-hour values was about 0.05 ppm.

Particulate matter levels (24-hour samples) had a satisfactory annual geometric mean value of 48 micrograms per cubic meter, against a Federal standard of 60. On 10 days of the year, however, the single daily value of 100 micrograms per cubic meter was exceeded; since Federal standards specify that this level shall not be exceeded more than once per year, there were 9 days of excess values of particulate matter.

Oxidant levels (one-hour samples) reached a maximum value of 0.12 ppm on one day, and exceeded 0.08 ppm on another day; and thus exceeded the State standard of 0.10 once, and the Federal standard of 0.08 ppm on two days. Since the Federal standard allows for one excess value per year, there was in fact one day of excess of each of the standards.

Regulatory Jurisdictions

The project site is subject to jurisdiction of the U. S. Environmental Protection Agency (EPA), the State ARB and the BAAPCD. Although relationships among these agencies and correlation of their requirements are presently in flux, primary operational responsibility appears to lie with the BAAPCD. Regulation 2 of that agency will require application for a permit for the construction and operation of the proposed building. The agency's review of that application will consider the air quality impact, at least as to the emissions from fuel consumption. Evaluation of the impacts of emissions from vehicle use due to the project is a normal concern of the agency, but is not clearly a part of the present requirements under permit review.

AIR QUALITY IMPACTS

Study Area

By far the greatest part of project-related emission occurs off-site, from vehicle use. Thus an analysis of on-site emissions alone would inadequately reflect the air quality impacts, and a larger area must be defined for the study.

As these vehicles leave the site, however, they go to widely scattered destinations, and their emissions become completely negligible in comparison to those of the very large numbers of other vehicles operated within the area encompassed by these destinations. Thus the study area must not be so large as to include any undue amount of non-project emissions.

The study area used in this analysis is equal in area to a circle of 1200-foot radius, and roughly follows the circumference of such a circle, centered on the site. It is defined as the area bounded by, and including, Montgomery, Clay, Drumm, Main, Mission and Second Streets.*

Emission Estimates

Emission rates (pounds per day) have been estimated for:

Carbon monoxide, nitrogen oxides, organic compounds, particulate matter and sulfur oxides;

Vehicular sources and building fuel-use sources;

The project-related emissions alone, and the total study-area emissions (including the project).

Vehicular emissions were estimated according to the method given in the EPA publication AP-42, "Compilation of Air Pollutant Emission Factors", as revised to September 1973; the vehicle-age-mix model was constructed from data in the BAAPCD "Source Inventory, 1971".

Emissions from fuel use in project buildings were estimated on the basis of emission factors given in the

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* See Illustration 1, page 6.

EPA publication cited above. Fuel-use emissions from the remaining portion of the study area were estimated by applying the same factors to the estimated fuel use in the area. This fuel use was approximated on the basis that (a) the project area is about 1/60th of the study area, in ground space; and (b) average fuel use, per square foot of ground space, would be at least one-quarter of that in the project area. A more precise estimate of such "other" fuel use, based on detailed information as to all occupancies within the study area, was judged unnecessary since (a) high-side emission estimates obtained by the approximation were in general substantially less than vehicular emissions, and thus less significant; and (b) project emissions from fuel use will be at substantial elevation (about 500 feet above grade), and thus of essentially no significance to ground-level concentrations near the site. In any case, the detailed occupancy data needed for more specific fuel use estimates throughout the study area were not available.

The estimates so developed, for the period of normal building occupancy (taken as 1977), are tabulated on the following page.

It may be anticipated that demolition and construction phases of the project will cause some emissions, from (a) dust generation in demolition of existing buildings, and in the moving and loading of debris, and in unloading and handling some types of construction materials; (b) the use of vehicles and heavy equipment in connection with the work and with the transport of personnel and of materials, giving rise to emissions from internal combustion engines; and (c) reduced speeds and increased congestion for non-project traffic in the immediate area, due to short- and long-term obstructions of streets and sidewalks by heavy equipment and by the necessary protective walls around the site during construction.

There is no reliable basis for estimating the amount or impact of emissions from any of these sources. They are temporary in nature, and subject to some degree of mitigation, as discussed below.

Air Quality Levels

As indicated in the table of emission projections, normal occupancy of the proposed building will contribute, from all project-related sources, an estimated maximum of about 1% to 3% of the total emissions of the various contaminants within the study area. (Table A9, page A33a)

While an endless succession of such small increments must ultimately have an effect on air quality levels, no measurable impact can be projected from the very slight increments estimated for this project. At the existing levels of air quality, changes of the order of 3% or less would be smaller than the error of measurement of most available instruments.

No increase in frequency of excesses over the applicable standards, as a result of the proposed action, is projected.

UNAVOIDABLE ADVERSE IMPACTS

Construction

During demolition and construction, assuming the best use of mitigating measures, some increase in the rate of emission of most of the noted contaminants must be expected. A measurable increase in particulate matter concentrations in the immediate vicinity of the site, on some occasions, seems probable.

Normal Occupancy

No measurable increase in contaminant concentrations is projected. Some slight increase in emission rates will occur.

Table A9

SUMMARY OF ESTIMATED EMISSIONS OF AIR CONTAMINANTS
(Pounds per Day)

	Carbon Monoxide	Nitrogen Oxides	Organic Matter	Partic. Matter	Sulfur Oxides
FROM PROJECT					
Vehicular	38.0	4.28	5.36	0.312	0.188
Non-vehicular	0.034	12.7	0.594	1.53	0.007
Totals	38.03	16.98	5.95	1.64	0.195
TOTAL STUDY AREA (with project)					
Vehicular	4222	475.6	595.6	34.67	20.89
Non-vehicular	0.486	181.4	8.486	21.86	0.097
Totals	4222	657.0	604.1	56.53	20.99
RELATIVE EMISSIONS (Project Emissions as % of Total)	0.9%	2.6%	1.0%	3.3%	0.9%

MITIGATING MEASURES RECOMMENDED

Construction

During the demolition and construction phases of the project, the following measures are recommended to reduce the probability, frequency and severity of any temporary impact:

--Ground-level debris, and other dusty materials, should be wetted at sufficient intervals to minimize dust generation; particular care should be exercised when such materials are being moved or handled.

--Project traffic should be scheduled, within practical limits, to avoid morning and evening peak traffic hours.

--Interference with non-project traffic should be minimized by (a) care in location of any necessary street or sidewalk obstructions, and (b) suitable scheduling, insofar as is practicable, to avoid impingement on peak-hour traffic by such temporary obstructions as heavy equipment.

Normal Occupancy

Both the design and the operation of the on-site parking facility should provide for rapid intake and discharge of the parking traffic, to minimize its interference with adjacent non-project traffic, and thus avoid additional increase in vehicular emissions.

APPENDIX C WIND/COMFORT

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* NOTE: Refer to pages 57-58 for actions which have occurred as a result of this study.

This Appendix was prepared for Skidmore, Owings & Merrill by Environmental Impact Planning Corporation, San Francisco, California.

I. INTRODUCTION

Architects, engineers, and city planners designing urban structures are limited by the lack of information on wind effects brought on by the presence of these structures, such as discomfort for pedestrians and wind-caused mechanical problems with doors, windows, and ventilating systems. Once a structure is built, remedial measures (if they exist at all) are usually very expensive.

It is virtually impossible to anticipate, by theoretical analysis or intuition, the winds that will be caused by a structure, since they are determined by very complex interactions of forces. Fortunately it is possible to predict the wind patterns and pressures around structures by testing scale models in a wind tunnel that can simulate natural winds near the ground. This allows the designer to foresee possible environmental and mechanical problems and to alleviate them before the building is erected.

Data from wind tunnel tests can be combined with climatological data to quantify the effect of a proposed structure on pedestrians in terms of human comfort. The frequency distribution of wind strengths at pedestrian level, combined with temperature data and shadow patterns of the proposed structure and its surroundings, can be used to forecast comfort at pedestrian levels in terms of percent of time that discomfort is experienced.

The research for this project was conducted in two phases. The current wind environment of the site was measured in Phase I. The impact of the wind environment due to construction of the proposed building was then evaluated in Phase II.

II. SUMMARY

A wind tunnel investigation was carried out on models of the site as it exists and as it would exist with the proposed structure. The findings show that the project would cause a general increase in wind velocities at the pedestrian level on the site and in the surrounding streets, and would create strong winds in some localized areas.

The areas found to be windiest after construction are the corner of Market and Front Streets during northwesterly, southwesterly, southerly, and southeasterly winds; the corner of Market and Fremont Streets during westerly and southwesterly winds; the new plaza area during westerly and southerly winds; and the roof terraces during northwesterly and southeasterly winds.

Winds would be generally increased on the northwest side of Market, especially near Front. At the east side of Front between Market and Pine there would also be higher winds.

The comfort analysis showed that pedestrian discomfort would increase along Market Street near Front Street and on Front Street. The largest increase in discomfort would occur at the south corner of the Market-Fremont intersection. The entrance plaza would have relatively high discomfort frequencies. Some potential mitigation measures are suggested.

III. BUILDING AND SITE DESCRIPTION

The project site is in downtown San Francisco on the block bounded by Market, Pine, Front, and Battery Streets. It is currently occupied by retail-office buildings two to six stories high.

The project entails construction of one high-rise structure about 537* feet in height. A 40-foot-high garage and a two-story retail building (up to 40 feet) would be associated with the project.

The high-rise structure would be on the corner of Front and Market Streets. The retail building would be west of the high-rise on Market and the existing garage would remain, further to the west on Battery Street. A pedestrian plaza is planned west of the high-rise and east of the retail building; it would open onto Market Street. Four rooftop terraces for the building's occupants are planned on the east side of the high-rise, on floors 32 to 35.

The new building would be much taller than the others on the block. The district surrounding the site is one of intensive high-rise development. The high-rise area extends several

blocks in both directions along Market Street, and the Financial District lies northwest of the site.

*The building as originally designed was 480 feet high. The design was modified after wind tunnel tests had been completed. A discussion of the effect of the additional height is at the end of Section VI.

IV. MODEL AND WIND TUNNEL FACILITIES

Model

A scale model of the proposed building and nearby structures was constructed of urethane foam, using a model supplied by the architect. A model of the structures surrounding the area for a distance of several blocks was constructed of wood and urethane foam.

The model scale was 1 inch = 30 feet. The model of the surrounding city area was built to this scale with building configurations and heights obtained from the Sanborn maps at the San Francisco Planning Department and from the architect.

The model with the proposed buildings was placed on a turntable in the wind tunnel, allowing it to be turned to simulate the various wind directions.

Wind Tunnel Facilities

The Environmental Impact Planning Corporation boundary layer wind tunnel was designed specifically for testing architectural models. The working section is 7 feet wide, 14 feet long, and 5 feet high. Wind velocities in the tunnel can be varied from 3.5 mph to 13 mph. The flow characteristics around sharp-edged objects such as architectural models are constant over the entire speed range. Low speeds are used for photographing tracer smoke, high speeds for windspeed measurements.

Simulation of the characteristics of the natural wind is facilitated by a series of adjustable slats, baffles, and perforated screens upwind of the test section. These allow adjustments in wind characteristics to provide for different scale models and varying terrain upwind of the project site.

Illustration A5

Model in wind tunnel. Hot-wire probe is shown above proposed building. Profile-producing slats are shown in background.

V. TESTING METHODOLOGY

Simulation of Flow

The most important factors in assuring similarity between flow around a model in a wind tunnel and flow around the actual building are the structure of the approach flow and the geometric similarity between the model and the prototype. A theoretical discussion of the exact criteria for similarity is not included in this paper, but may be found elsewhere (Cermak, 1966, or Cermak and Arya, 1970).

The variation of windspeed with height (wind profile) was adjusted for the scale of the model and the type of terrain upwind of the site by a system of horizontal slats. The profiles used were those generally accepted as adequately describing the flow over that type of terrain (Lloyd, 1967).

Testing Procedure

The characteristics of wind flow at the site in its present state were investigated to ascertain the present wind environment. Wind directions and windspeeds at specified points throughout the site were measured and recorded. Wind direction was measured by releasing smoke at each point and recording the direction in which the smoke traveled. Windspeed measurements were made at the same points, at a scale height of five feet above the ground. A hot-wire anemometer probe is required to make these measurements within a fraction of an inch of the model surfaces. The probe is repeatedly calibrated. Velocity readings close to the model are generally accurate within 10 percent of the true velocity.

A similar technique was used to measure the wind environment with the proposed buildings in place. Measurements were taken around the buildings and on the adjacent streets. A calibration measurement was made above the model before and after each test run. The purpose of these calibrations was to relate the wind tunnel measurements to actual wind records from U.S. Weather Service wind instrumentation located on the Federal Building at 50 Fulton Street (San Francisco Weather Station).

VI. TEST RESULTS AND DISCUSSION

Tests of windspeed and wind direction were conducted for five wind directions.

Measured windspeeds are expressed as fractions of the calibration windspeed, which corresponds to the actual windspeed at the San Francisco Weather Station. Thus a plotted value of .52 means that the measured windspeed is expected to be 52% of the windspeed recorded by the Weather Service.

The fractional windspeed is a measure of the shelter or exposure of the point in question. It will normally vary with wind direction, due to the changing relation of wind and building geometry.

The plotted values can be interpreted in terms of general "windiness" using the scale below. This scale is subjective and is based on information gathered from similar studies in San Francisco.

Velocity	Fraction of calibration windspeed
Low	.0 - .19
Moderately low	.20 - .29
Moderate	.30 - .49
Moderately high	.50 - .69
High	.70 - 1.00
Very high	1.00

It should be noted that the actual wind experienced at a given site will depend on the strength of the general flow above the city as well as the fractional windspeed. Thus, an area of "moderately low" winds on a windy day could have greater windspeeds than an area of "high" winds on a calm day.

Wind direction is indicated by an arrow pointing in the direction of flow. Where wind direction fluctuated, two arrows representing the principal flow directions were plotted.

Northwest Wind

Northwest winds occur 12% to 39% of the time in San Francisco, depending on the season. (In meteorology, a northwest wind blows from the northwest.) Northwesterly and westerly winds

are the most frequent and strongest winds at all seasons in San Francisco. Northwest winds exceed 13 miles per hour 35% of the time and 25 miles per hour 3% of the time in summer. Wind frequencies and speeds are lower in spring, fall, and winter.

The site is generally sheltered due to the upwind position of the Financial District. The major flows are southward on Front Street, continuing across Market and southeast on Fremont Street; and northeast on Market, merging with the flow entering Fremont. Illustration A6 shows that the wind velocities are generally low throughout the site.

Completion of the proposed project (see Illustration A7) would cause winds to increase to moderate velocities at Market and Front. Winds elsewhere on the site would remain relatively unchanged. A directional change would occur in front of the proposed building along Market.

Along the terraced roof area of the proposed building, velocities would exceed San Francisco Weather Station figures. These very high winds would occur at the north end of the building; the south end would be sheltered by the building itself.

West Wind

West winds occur between 15% and 40% of the time, depending on the season. West winds exceed 13 miles per hour 29% of the time and 25 miles per hour 7% of the time in summer. Wind strengths and frequencies are somewhat lower in spring, fall, and winter.

The site is moderately sheltered from west winds due to the built-up nature of the area windward of the site. The exceptions to this are winds coming down Bush and Pine Streets.

The major windflows on the existing site are from the west down Bush and Pine Streets (see Illustration A8). The wind from Bush crosses the pedestrian area fronting Market and flows northeast on Market and down Fremont to the southeast. The flow on Pine Street turns on Front and moves south. Winds on Pine and Market reach moderate velocities. Wind velocities are generally low elsewhere on the site.

Construction of the proposed building would funnel the west winds through the proposed plaza to join the existing flow across Market and down Fremont (Illustration A9). These winds

would be of moderate to high velocity. The flow down Front Street would be accelerated to moderate velocities and would join the flow on Fremont.

On top of the proposed building, winds on the northern corners would be accelerated to moderate velocities. The southern corners would be sheltered and would have low windspeeds.

Southwest Wind

Southwest winds occur on an average of 9% annually in San Francisco. Winds are highest in winter, when they exceed 25 miles per hour 2% of the time.

The site is somewhat sheltered from southwest winds by high-rise buildings along Market Street.

Illustration A10 shows that the major windflow is to the northeast along Market. This major flow has moderately high velocities on the north side of Market at Front Street. The flow along Market turns north on Front and reaches moderately high velocities at the corner of Front and Pine Streets.

Construction of the project would increase the velocity of the winds along Market and Front Streets (see Illustration A11). The winds would be little changed elsewhere on the site. The winds on the roof terraces would be low due to sheltering by the highest level of the building itself and by other high-rise structures upwind.

South Wind

South winds are infrequent except during winter storms, when moderate to strong wind is often combined with rain. They are expected to occur 12% of the time in the months of December through February, exceeding 13 miles per hour 1% of the time. During other seasons south winds are light and occur less than 3% of the time.

The site is somewhat exposed to south winds. There are several large buildings upwind of the site, but these provide only a narrow front to the large open area south of Mission Street.

Illustration A12 shows that the major flow is toward the north along Front Street. The wind blows from the open areas south

of Mission and is funneled by the Metropolitan Life Building and the three proposed Bechtel Buildings to the northwest along Fremont across Mission and to the north along Front. Wind velocities are high along Fremont and moderately high along Front. Winds on Market are accelerated, and merge with the flows from Fremont to Front.

If the proposed building is constructed, the winds along Market in front of the site would be increased to high velocities (see Illustration A13). The pedestrian plaza would also have high-velocity winds. Wind velocities on the roof terraces would be generally low.

Southeast Wind

Southeast winds occur less than 3% of the time in spring and summer and 6% in fall. They are generally light during these seasons. In winter they can be expected 17% of the time, with speeds over 13 miles per hour 10% of the time.

As with south winds, the site is somewhat exposed to southeast winds.

Illustration A14 shows that the major flow is toward the northwest on Fremont; it crosses Market and is directed north on Front Street. Velocities are high on Fremont and moderately high on Front. Elsewhere on the site the winds are mainly low.

Construction of the proposed building would not change velocities or flow directions essentially (Illustration A15). The major flow would still be along Fremont to Front and the velocities would remain moderate to high. The northern corners of the top levels of the proposed building would have moderately high velocities. The southeast wind would flow between the Bechtel Buildings and the Metropolitan Life Building and blow across the northeast corners unobstructed.

Effect of Additional Height

The model tested in the tunnel had a scale height of 480 feet. The proposed building height was increased to 537 feet after tests were completed. Although further wind tunnel testing would be required to make accurate predictions, a subjective estimate can be made. During westerly winds, speeds in the plaza and adjacent sidewalk areas would be increased. The increase in the plaza area could be between 10 and 25 percent. At 537 feet, the building would be higher than the neighboring Metropolitan Life Building. This is expected to cause slightly

higher windspeeds on the roof terraces during south and southeast wind conditions. The impact of the increased height is probably not very significant at other wind directions.

VII. COMFORT ANALYSIS

Discomfort in the wind is caused by thermal cooling and mechanical effects (flapping clothes, blowing dust and leaves, blowing hair). The rate of thermal cooling depends on a variety of factors that include clothing levels, temperature, sunshine, and pedestrian activity, as well as windspeed. Because the relationship between these factors and comfort is complex, and because clothing and activity levels vary widely from person to person, the quantitative assessment of discomfort due to thermal effects is a difficult and time-consuming task. For this reason, only the mechanical effects of wind on comfort have been quantified in this report.

Research has shown that mechanical effects occur at windspeeds of 12 mph and above, while thermal discomfort can occur below 12 mph (Arens, 1972; Penwarden, 1973). The problem of defining the frequency of discomfort due to mechanical effects is therefore reduced to finding the frequency of winds greater than 12 mph.

Climatic Data

Wind data are recorded at the Federal Building on Fulton Street, but have not been analyzed extensively and are given only in terms of monthly averages. The extensive data required for comfort analysis are available, however, from the San Francisco International Airport. In this study the airport figure has been modified to approximate Federal Building data by multiplying it by the ratios of the monthly averages for the two locations. These ratios vary systematically throughout the year, suggesting good correlations between the sites. This is to be expected, since both areas are dominated by the same climatic conditions.

Comfort Calculations

Estimates of discomfort frequency are calculated by combining existing climatic data from the San Francisco Weather Station

(old Federal Building) with data obtained from the wind tunnel research. Using climatological data for the appropriate season and hour of the day, and the fractional wind velocity measured in the wind tunnel, the percentage of time that the wind exceeds 12 mph is calculated. Calculations are made for each wind direction at each point of interest, and the results are weighted by the frequency of each wind direction for that particular season. The final result is the frequency of discomfort due to mechanical effects, based on a discomfort threshold of 12 mph.

Interpretation of Results

The actual frequency of discomfort will be higher than the calculated values because thermal effects have been ignored. It is possible, however, to assess qualitatively the importance of thermal effects. An important factor in determining thermal comfort in the wind is solar insulation. A person in the sun can tolerate much higher wind than a person in the shade, assuming all other factors to be equal. For this reason, areas of sun and shade for each time of day and season have been included in the plots of the comfort results.

The effect of rainfall has not been integrated into the comfort maps. It is reasonable to assume that rainfall will cause all outdoor spaces to be uncomfortable, although the discomfort can be much worse when rain is wind-driven. If rainfall were taken into consideration, the actual frequencies of discomfort for winter and spring would be considerably higher. Rain occurs 12.2% of the time in January, 5.4% in April, 0.1% in July, and 3.1% in October. The rain is strongly associated with winds from the directions southeast through southwest.

The comfort analysis was carried out for 1 p.m. on the first day of each season. The hour chosen was assumed to correspond to the time when people would most want to be outdoors to eat lunch, shop, or go for a walk.

Winter

All measurement points are shaded at 1 p.m. in winter. Illustration A16 shows that discomfort frequencies are low in general. The highest discomfort frequencies occur on the east side of Front and Fremont Streets.

Illustration A17 shows that discomfort frequencies due to higher winds would increase by a small amount almost uniformly around the site. Increases are on the order of 1-2 percent of the time. The new entrance plaza is relatively less comfortable than other areas near the site.

Spring

All measurement sites would be in shade at 1 p.m. during spring. Illustration A18 shows that discomfort frequencies are currently low in areas adjacent to the site. The highest discomfort levels are found across Market Street at the intersection of Market and Fremont Streets.

Completion of the proposed project would increase discomfort frequencies significantly (Illustration A19). The entrance plaza would have relatively high frequencies, as would the south and east corners of the Market-Fremont intersection. The frequency of discomfort would be more than doubled in areas fronting Market Street, except for the plaza surrounding the Mechanics' Monument, which would remain unchanged. Similar increases are expected on the east side of Front Street.

Summer

During summer, at 1 p.m. most of the area surrounding the site would be in sunshine. Areas in the shade would include the Fremont-Market Street intersection and the west side of Front Street.

Illustration A20 shows that discomfort frequencies are currently uniformly low, with the exception of the Fremont-Market intersection.

With completion of the proposed project, discomfort frequencies would increase everywhere except the Mechanics' Monument Plaza (Illustration A21). The greatest increase would occur at the south corner of the Fremont-Market intersection, with significant increases along Market Street near Front Street, and along Front Street. The entrance plaza would have relatively high discomfort frequencies.

Fall

At 1 p.m. during fall, all measuring points would be in shade. Illustration A22 shows that discomfort frequencies are currently low and uniform. The highest frequency of discomfort is found on the east corner of the Market-Fremont intersection.

After completion of the proposed project, discomfort frequencies would be increased along Market near Front, along Front Street, and at the south corner of the Market-Fremont intersection (Illustration A23). The latter would experience a tenfold increase in discomfort frequency. The entrance plaza would have a relatively high frequency of discomfort.

Effect of Additional Height on Comfort

The effect of additional height would be greatest in the entrance plaza. Windspeeds would be increased on the order of 15 percent during west and northwest winds. This would increase discomfort due to mechanical effects on the order of 1-2 percent. Other areas near the building would not be significantly affected.

VIII. SUGGESTED MITIGATING MEASURES

There are two types of mitigating measures. The first is to make major design changes to reduce winds near the project, such as different building orientations or alterations in size or shape. Generally, unless wind tunnel input was considered from the outset, such changes to improve wind conditions are not feasible. As a result, no major design modifications have been considered in this study.

The second type of mitigating measure involves additions to the project that would provide local shelter for pedestrians. There are only two areas in this project where local protection measures could have an appreciable effect. These are the roof terraces on top of the proposed building and the new pedestrian plaza west of the proposed building. Fin walls could be attached to the north end of each roof terrace to reduce the northwest, west, and southeast winds. Further study using a larger model would be needed to determine optimum height, shape, and location of the fin walls.

A possible method of reducing winds in the entrance plaza would be to roof over all or part of the plaza. A preliminary test was performed on the proposed building to determine the effect of roofing over the entire plaza (see Illustration 24). Under westerly wind conditions a 58% reduction was found at its

entrance and a 32% reduction at the curb side on Market. Further wind tunnel research would be necessary to determine optimum height and extent of the roofed area, taking into account aesthetics and economic feasibility.

Use of transparent or translucent materials could provide an out-of-doors atmosphere while furnishing protection from the wind.

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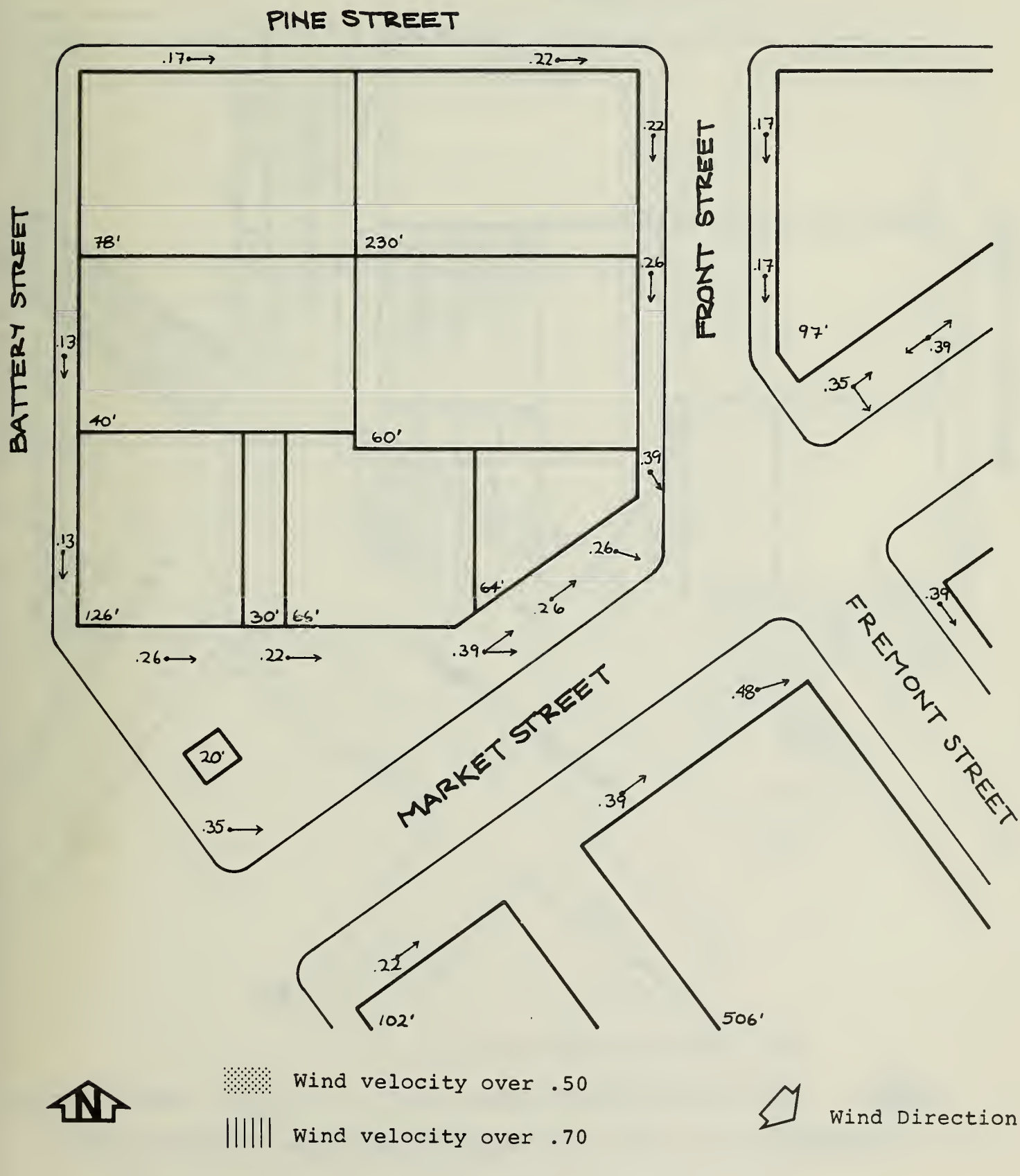
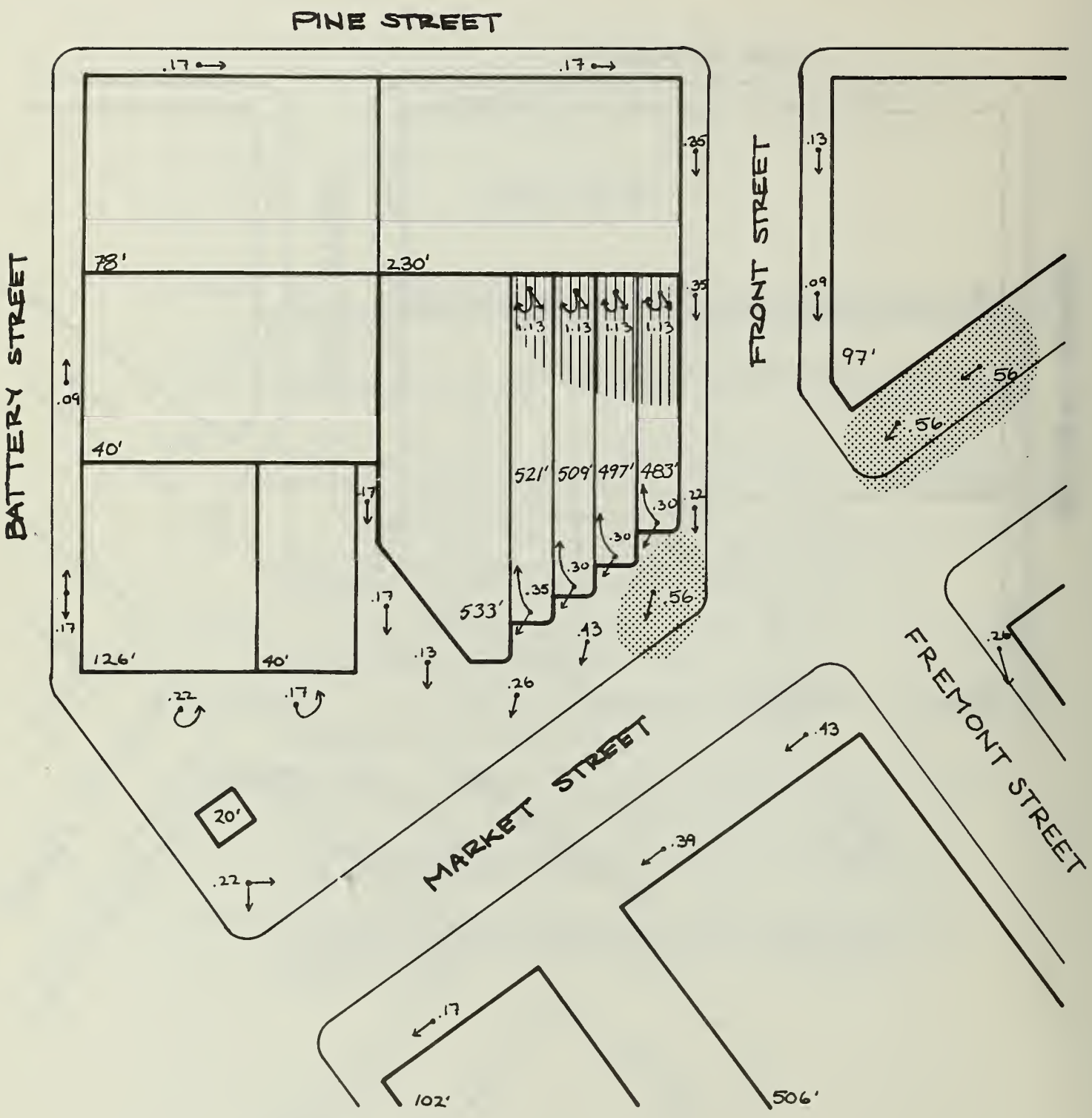


ILLUSTRATION A6 - EXISTING SITE. NORTHWEST WIND.

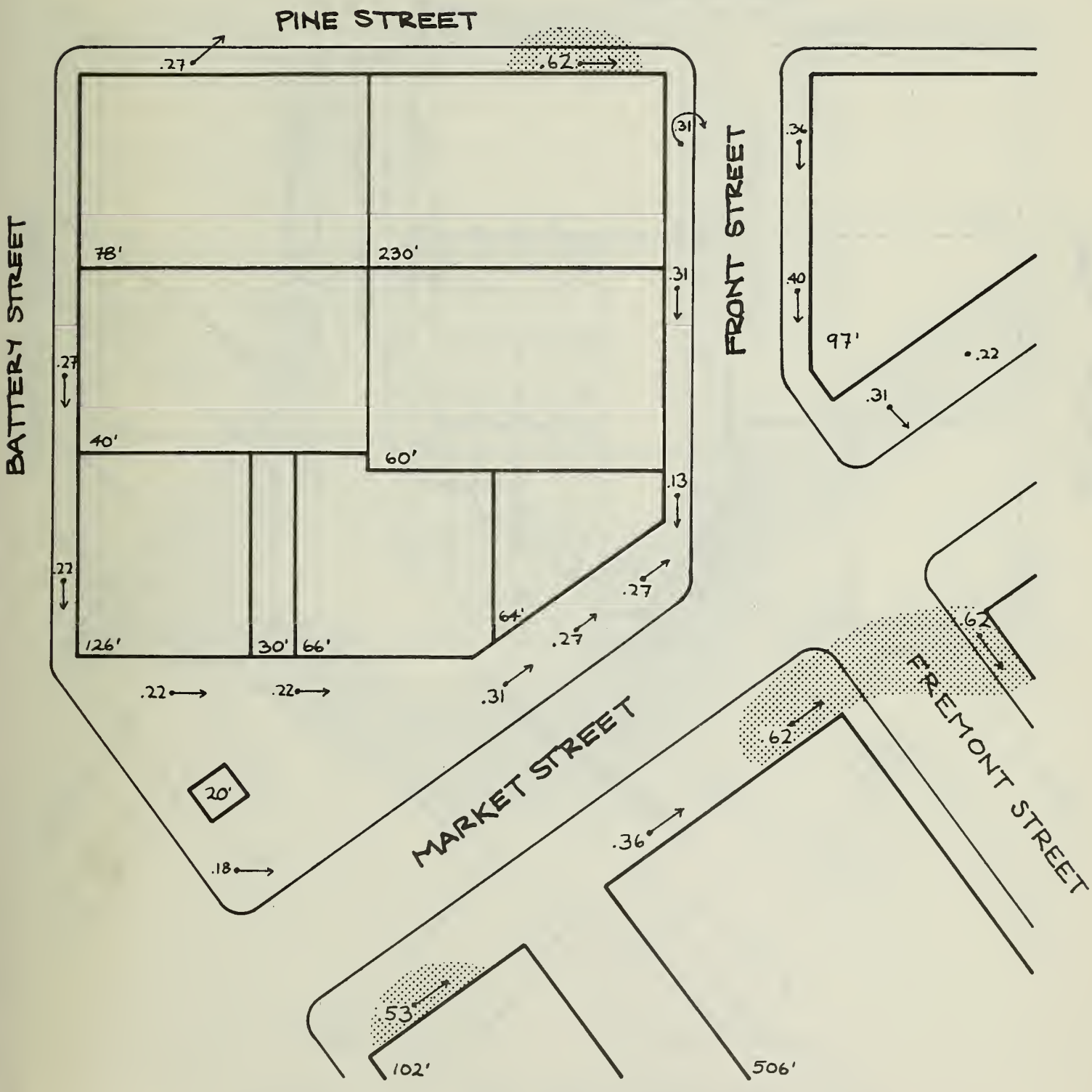


Wind velocity over .50

Wind velocity over .70

Wind Direction

ILLUSTRATION A7- SITE WITH PROPOSED BUILDING. NORTHWEST WIND.

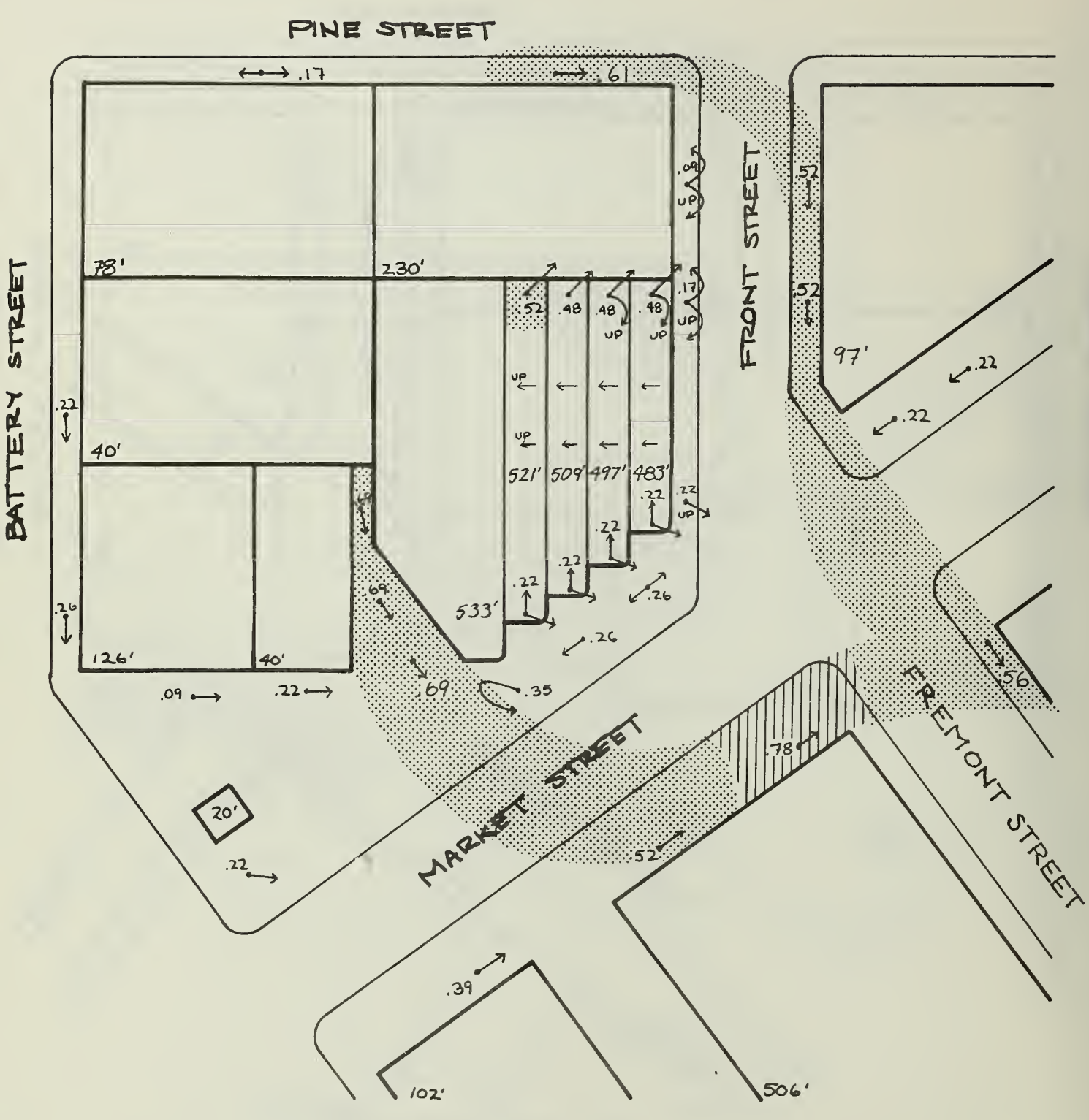


Wind velocity over .50

Wind velocity over .70

Wind Direction

ILLUSTRATION A8 - EXISTING SITE. WEST WIND.



Wind velocity over .50

Wind velocity over .70

Wind Direction

ILLUSTRATION A9 - SITE WITH PROPOSED BUILDING. WEST WIND.

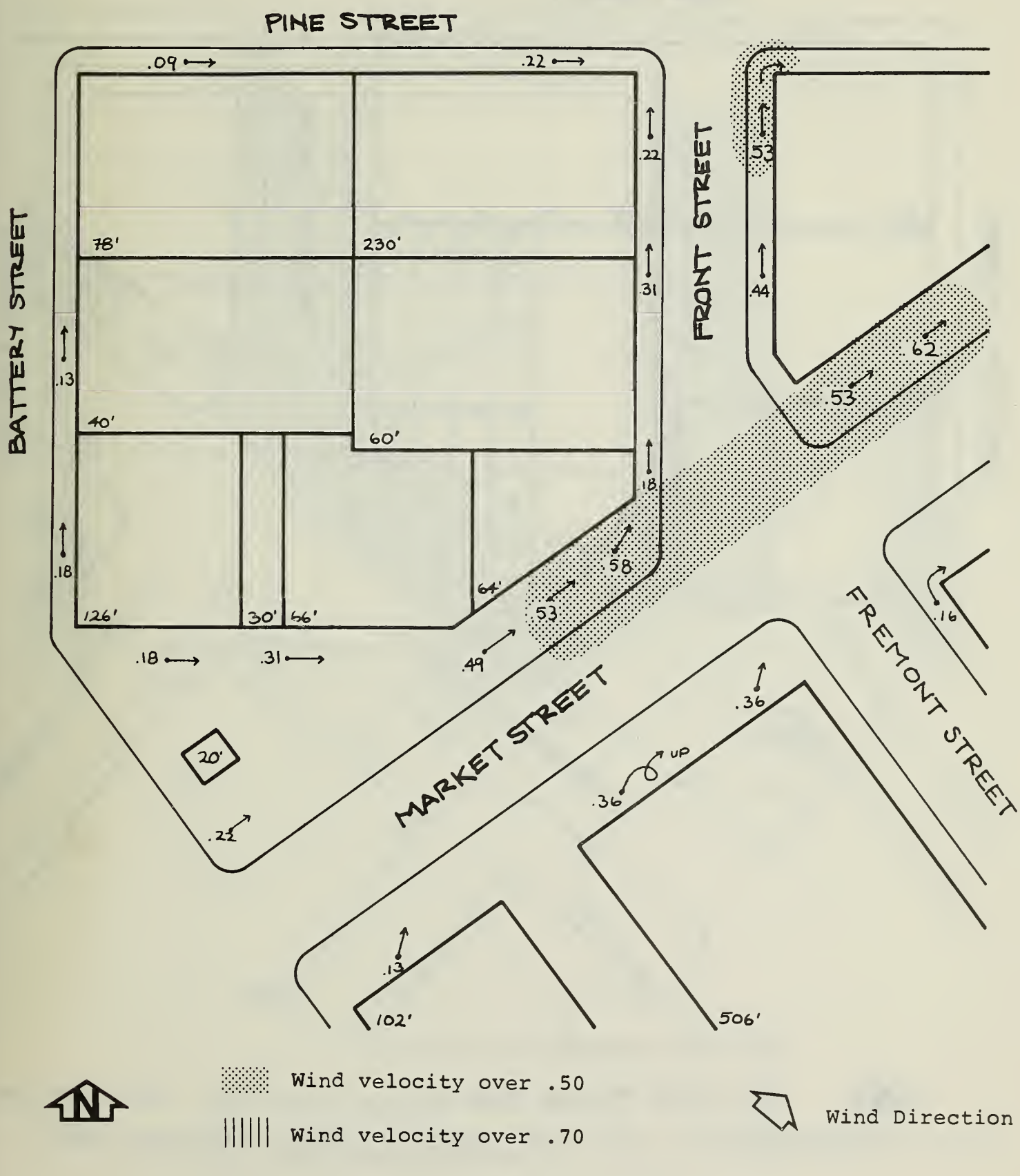
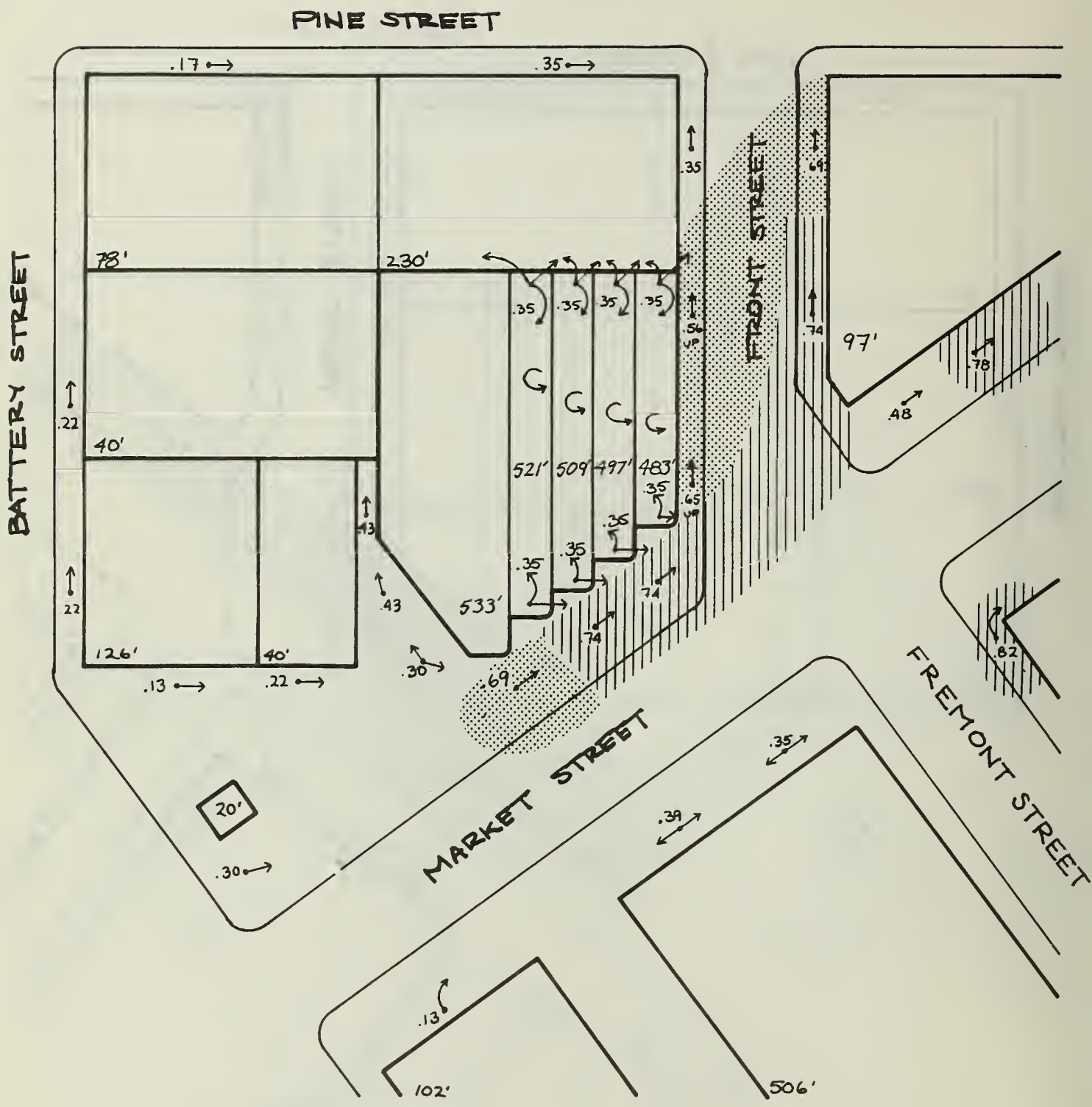


ILLUSTRATION A10- EXISTING SITE. SOUTHWEST WIND.



Wind velocity over .50

Wind velocity over .70

Wind Direction

ILLUSTRATION A11 - SITE WITH PROPOSED BUILDING. SOUTHWEST WIND.

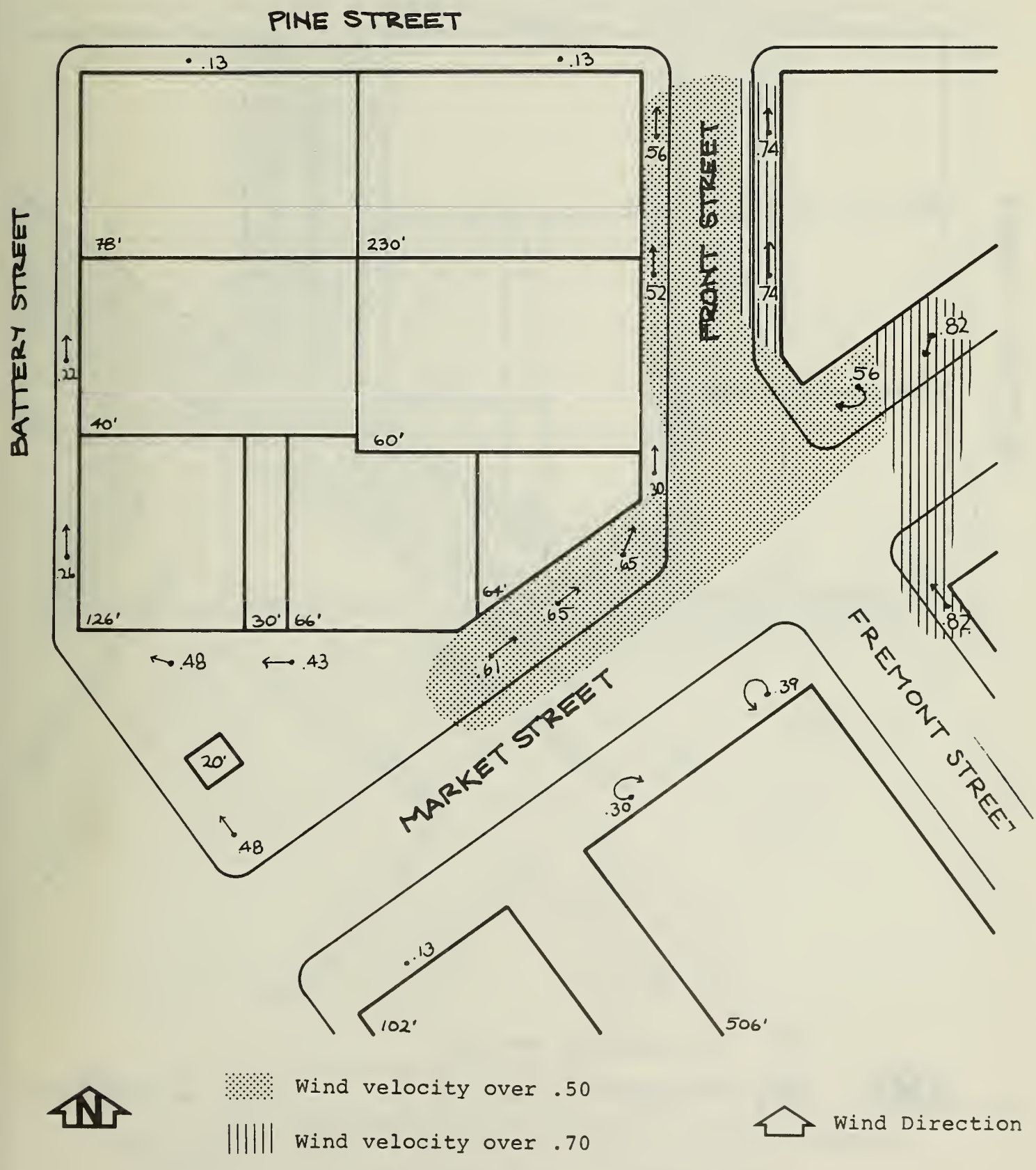


ILLUSTRATION A12 - EXISTING SITE. SOUTH WIND.

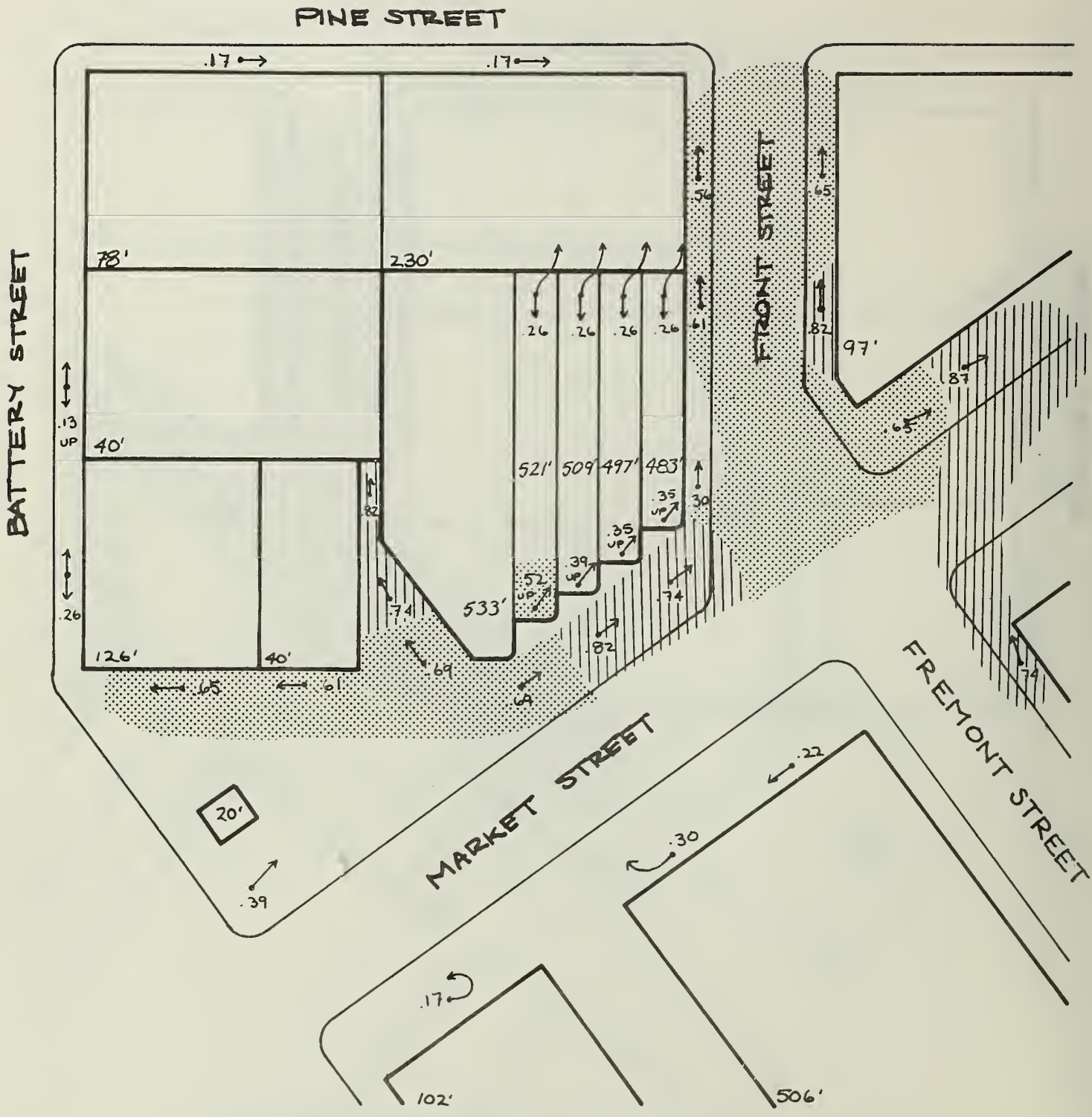
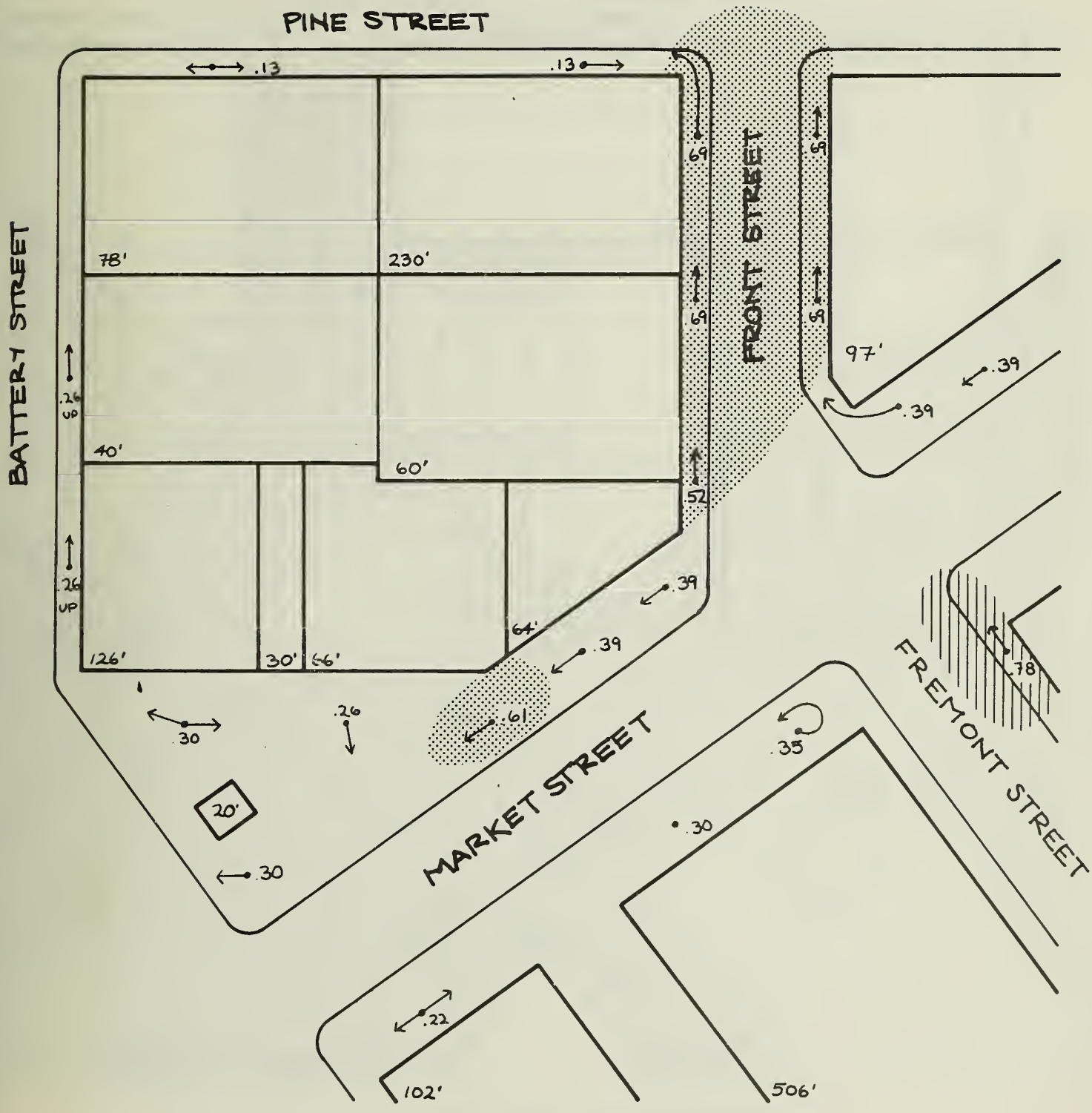


ILLUSTRATION A13 - SITE WITH PROPOSED BUILDING. SOUTH WIND.

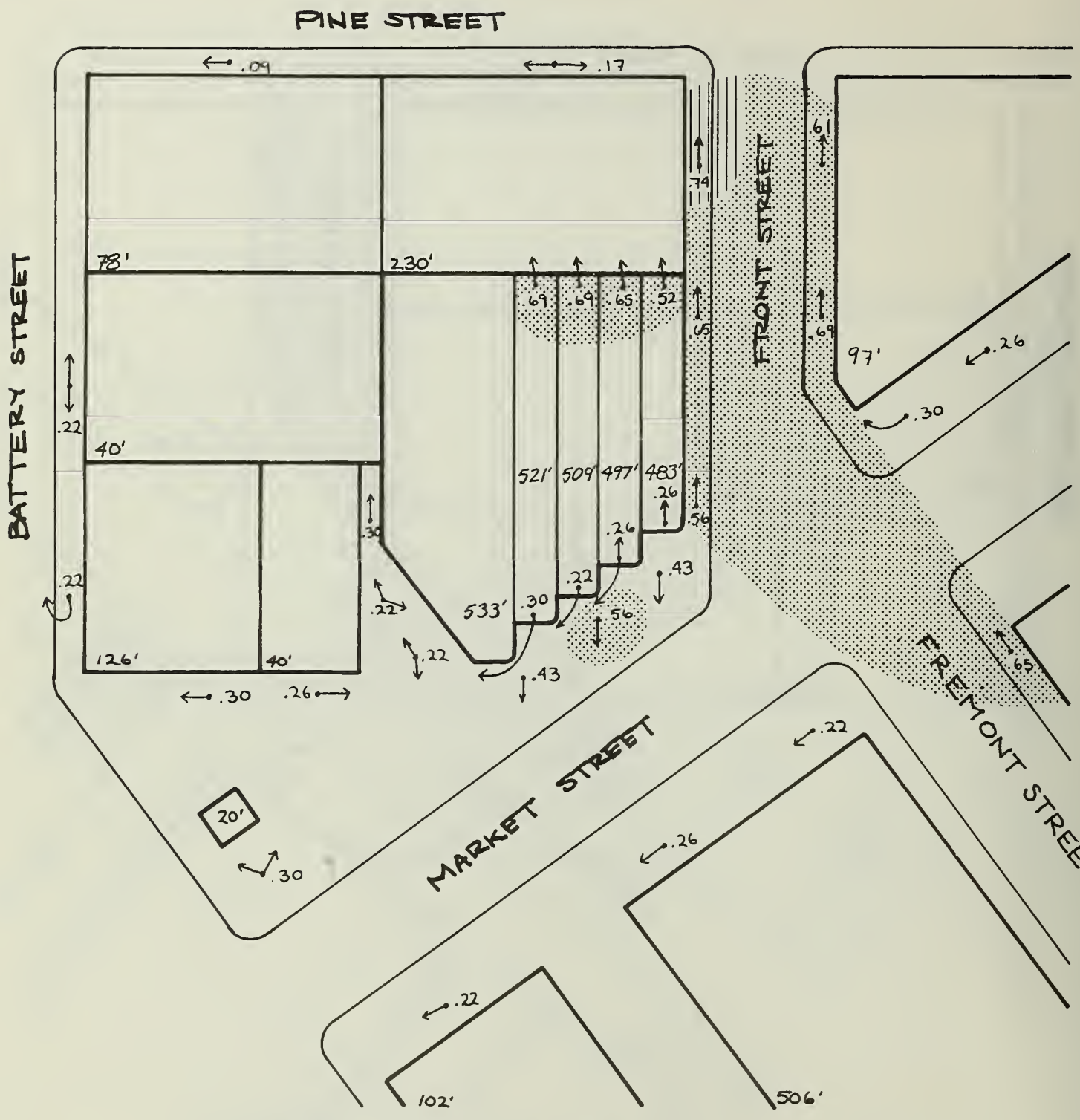


Wind velocity over .50

Wind velocity over .70

Wind Direction

ILLUSTRATION A14 - EXISTING SITE. SOUTHEAST WIND.



Wind velocity over .50

Wind velocity over .70

Wind Direction

ILLUSTRATION A15 - SITE WITH PROPOSED BUILDING. SOUTHEAST WIND.

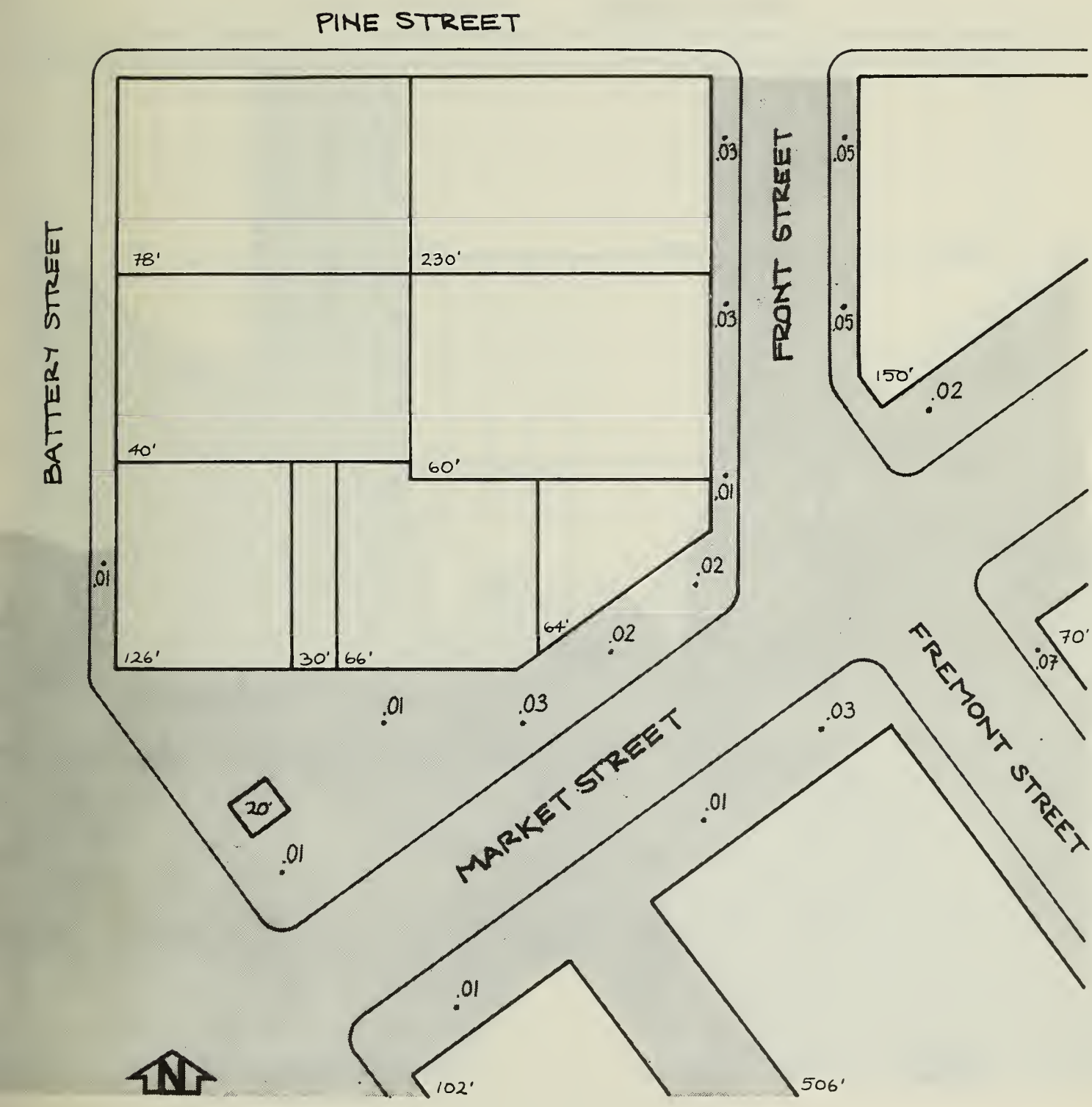


ILLUSTRATION A16 - COMFORT DIAGRAM AT 1 p.m. WINTER
Figures are the fraction of time that discomfort would be experienced.

EXISTING SITE

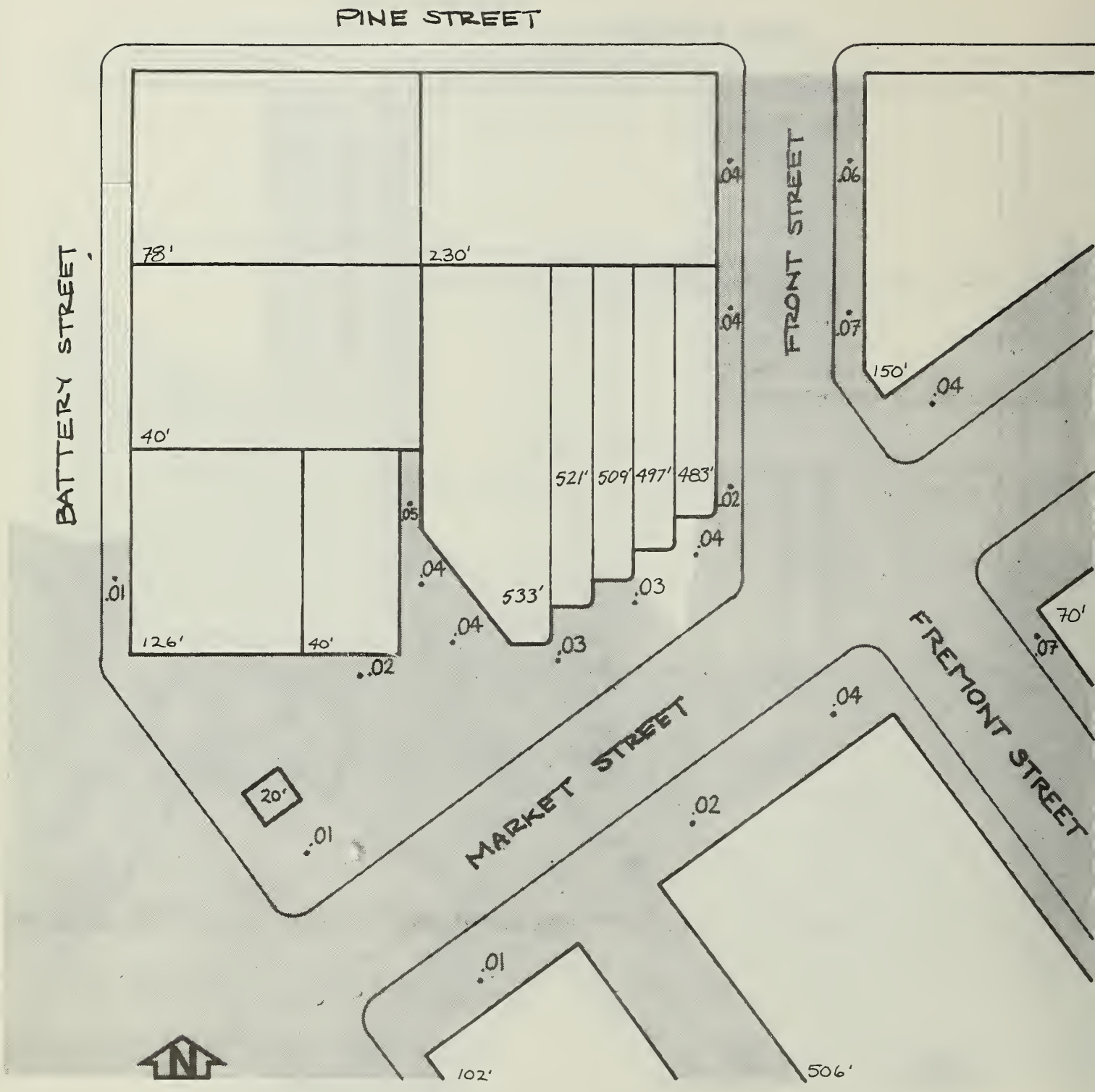


ILLUSTRATION A17 - COMFORT DIAGRAM AT 1 p.m. WINTER
Figures are the fraction of time that discomfort would be experienced.

SITE WITH PROPOSED BUILDING

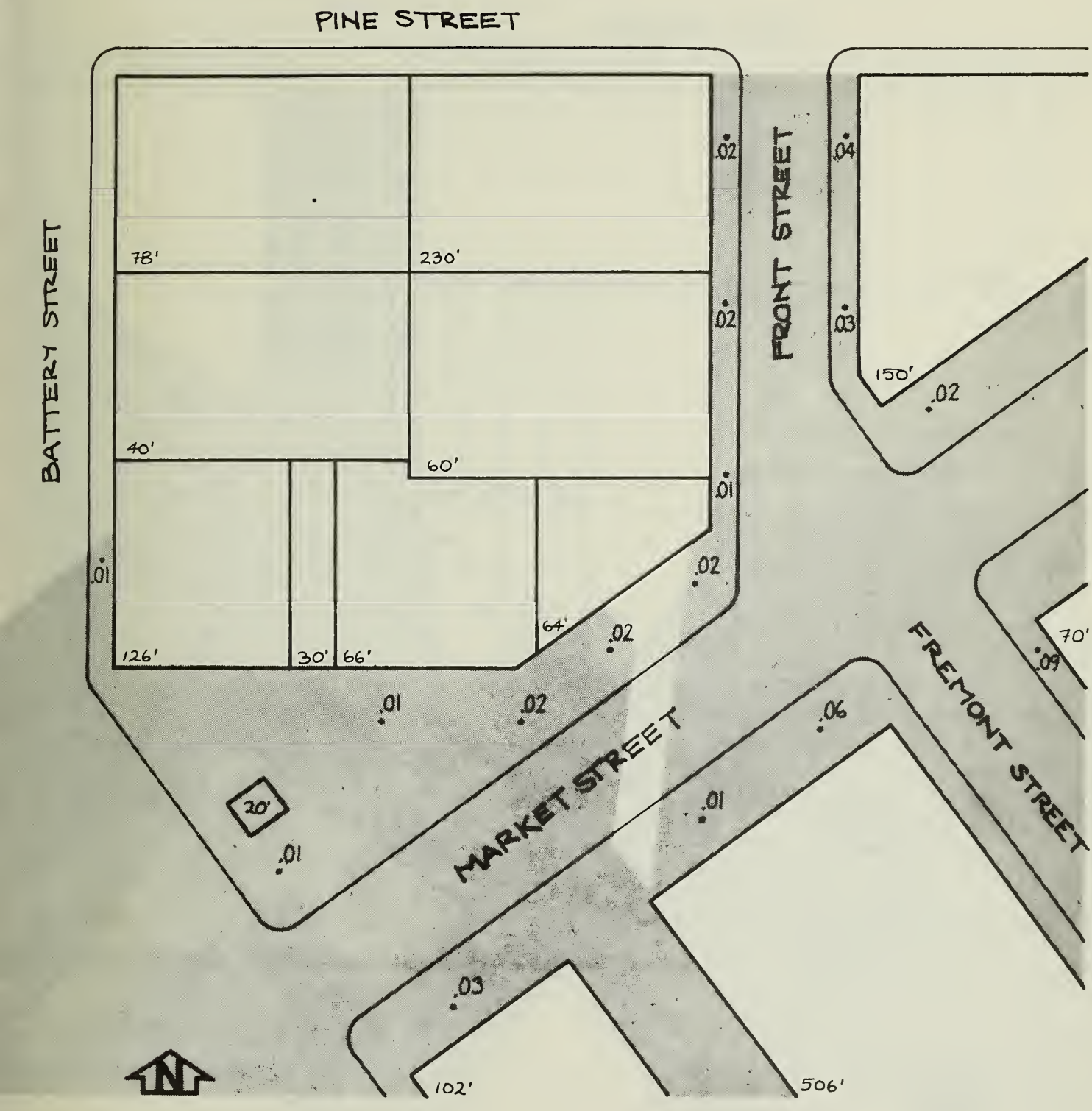


ILLUSTRATION A18 - COMFORT DIAGRAM AT 1 p.m. SPRING
Figures are the fraction of time that discomfort would be experienced.

EXISTING SITE

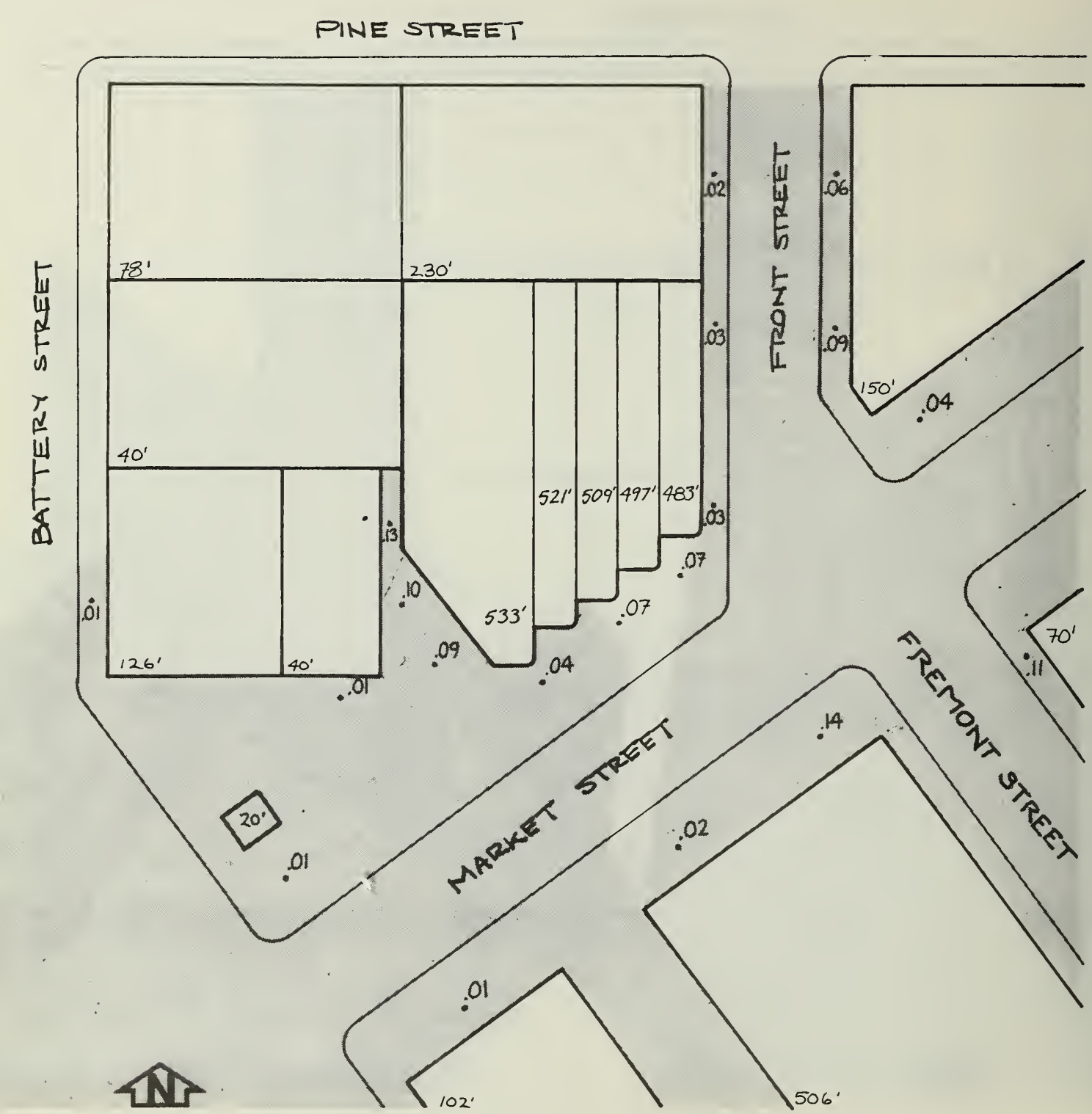


ILLUSTRATION A19 - COMFORT DIAGRAM AT 1 p.m. SPRING
Figures are the fraction of time that discomfort would be experienced.

SITE WITH PROPOSED BUILDING

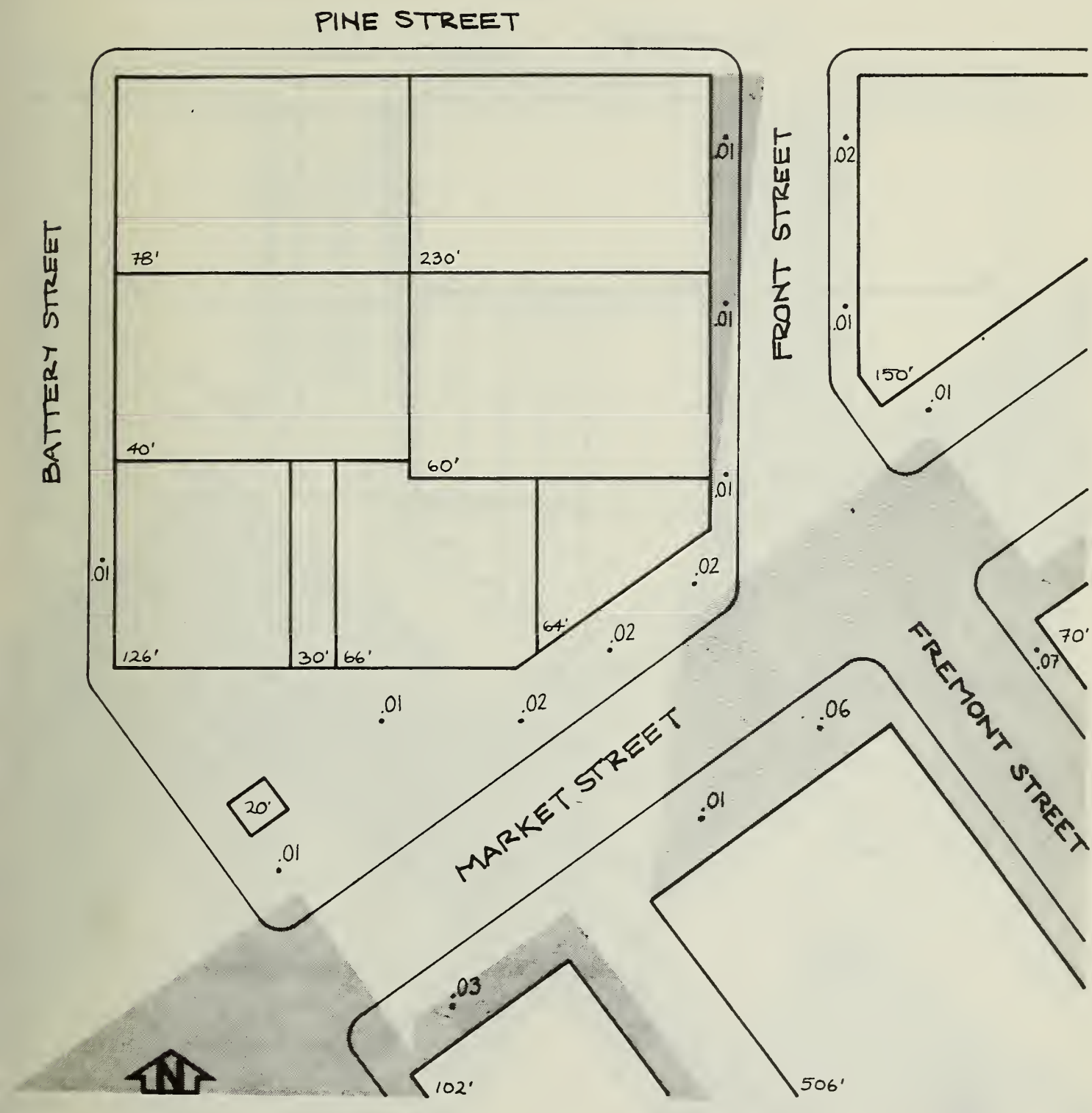


ILLUSTRATION A20 - COMFORT DIAGRAM AT 1 p.m. SUMMER
Figures are the fraction of time that discomfort would be experienced.

EXISTING SITE

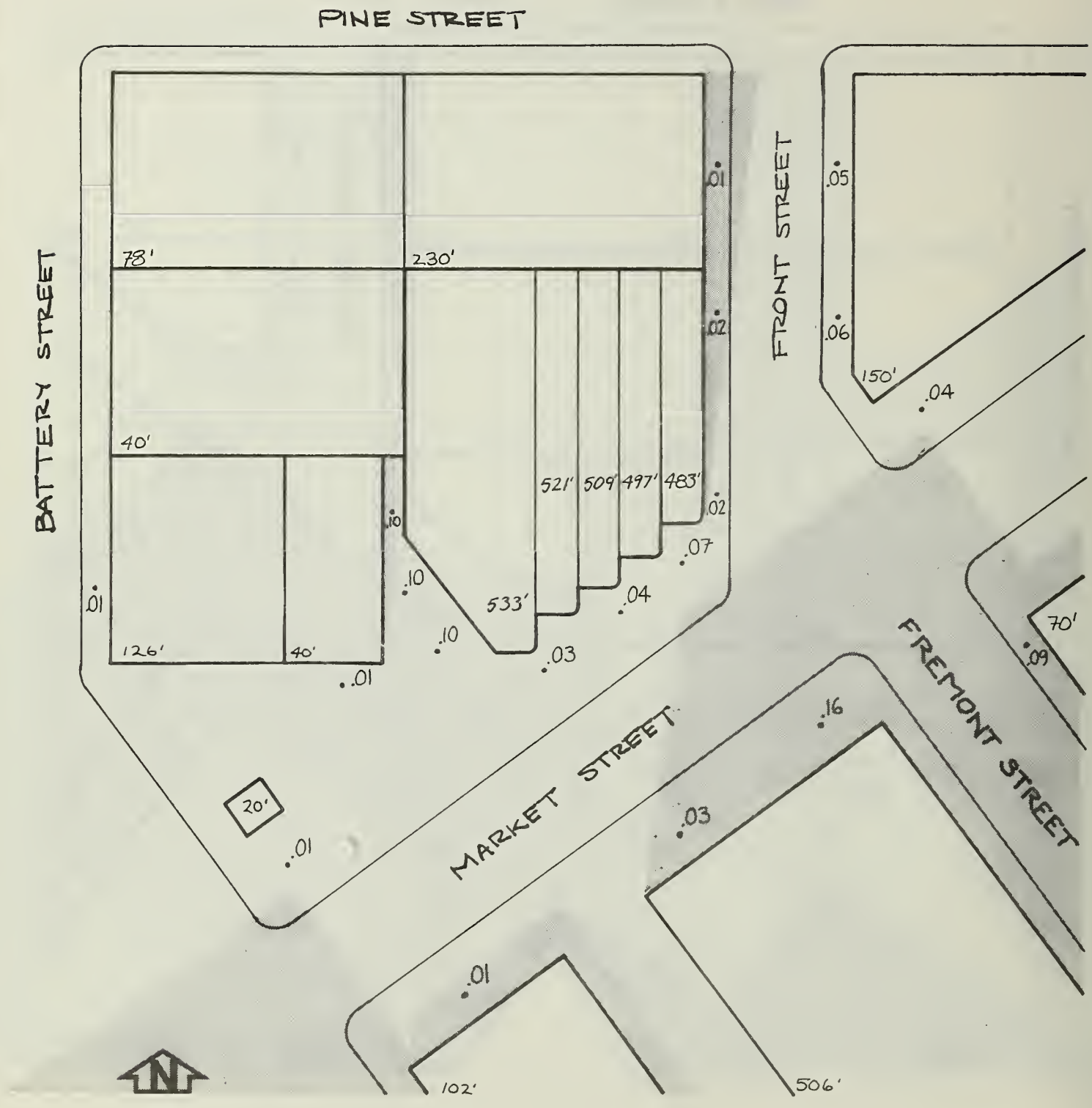


ILLUSTRATION A21 - COMFORT DIAGRAM AT 1 p.m. SUMMER
Figures are the fraction of time that discomfort would be experienced.

SITE WITH PROPOSED BUILDING

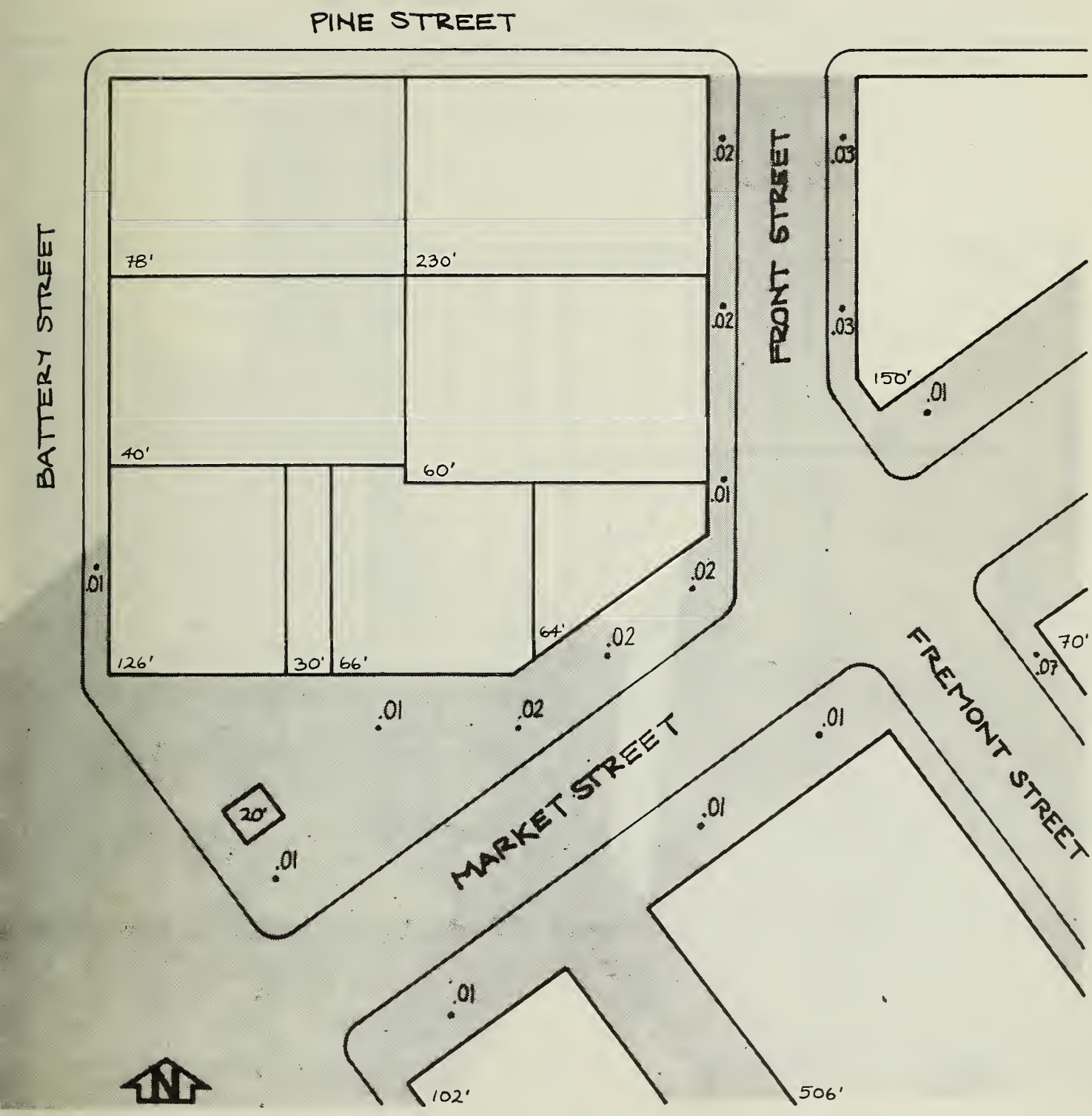


ILLUSTRATION A22 - COMFORT DIAGRAM AT 1 p.m. FALL
Figures are the fraction of time that discomfort would be experienced.

EXISTING SITE

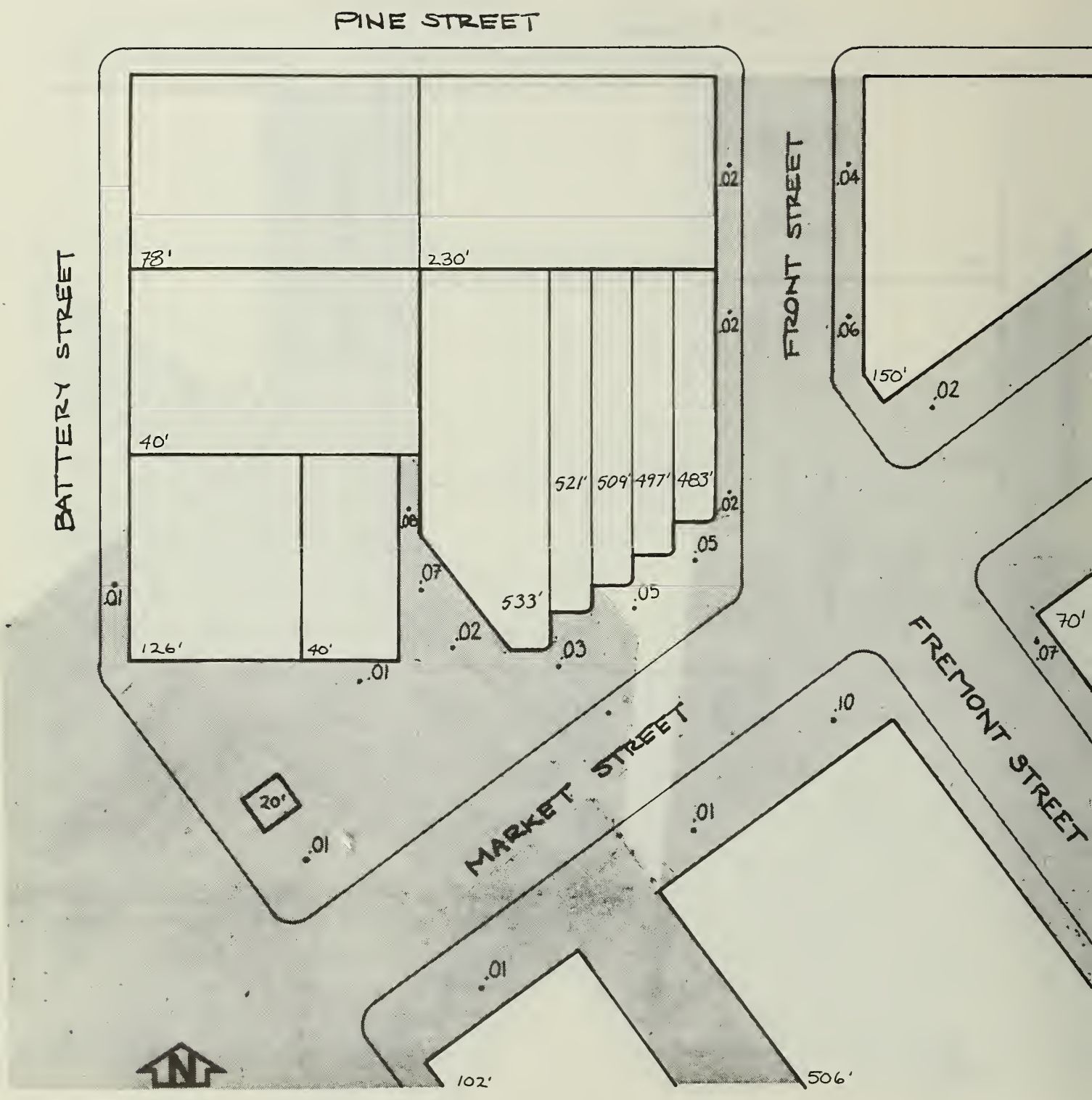


ILLUSTRATION A23 - COMFORT DIAGRAM AT 1 p.m. FALL
Figures are the fraction of time that discomfort would be experienced.

SITE WITH PROPOSED BUILDING

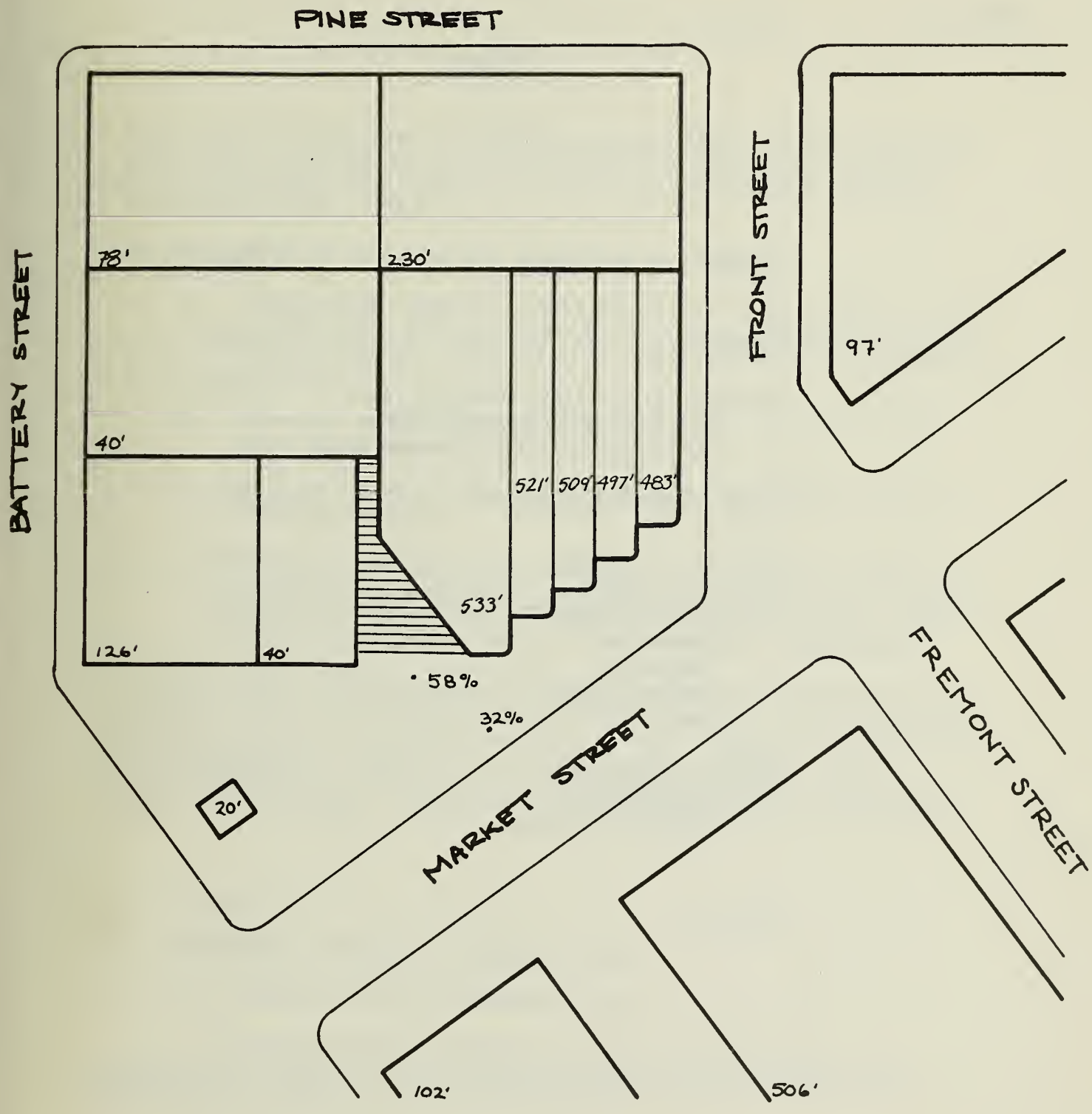


ILLUSTRATION A24 - Percentage reduction of westerly winds due to roofing of plaza.

Wind Direction

APPENDIX D NOISE

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This Appendix was prepared for Sedway/Cooke by Buonaccorsi & Associates, Consulting Engineers, San Francisco, California.

SUMMARY

This study was undertaken to determine the acoustical impact of the proposed office building at 444 Market Street, San Francisco, California, on the surrounding environment as required by the California Environmental Quality Act of 1970.

The conclusions of the study are summarized as follows:

1. Construction noise will cause short-term "great impact". The San Francisco Noise Assessment and Control Ordinance No.274-72, Section 2907 should be strictly observed to minimize annoyance to noise.

2. Increases in vehicular activity due to the project will not cause noise impact.

3. Increases in parking facility use due to the project will not cause noise impact.

4. Mechanical and Electrical equipment in the building could generate objectionable noise for nearby pedestrians. We recommend control of the equipment noise so it does not exceed the evening background noise level in the vicinity of the project.

Section I of the following report provides background information to aid in understanding the remainder of the report. Section II discusses the existing noise levels in the Study Area, a basic reference for determining acoustical impact. Section III defines criteria for noise impact. Section IV evaluates the acoustic aspects of the project in light of the noise impact criteria. Mitigating measures are presented in Section V.

I. FUNDAMENTAL CONCEPTS OF COMMUNITY NOISE

A. Description of Environmental Noise

Airborne sound or noise is caused by rapid changes in air pressure with the sound waves radiating away from the source in all directions (1, 2).

The subjective effect of this noise on the listener is characterized by three qualities:

1. The frequencies of the noise;

2. The intensities of the noise;

3. The time varying character of the noise.

The frequency of a sound is the number of oscillations a particle undergoes in 1 second. One complete oscillation is a cycle and the unit of frequency is the Hertz (Hz) which is numerically equivalent to the cycle per second (cps). A string vibrating 261 times in 1 second (261 Hz) will produce the subjective tone of middle C (3).

The human ear is sensitive to a wide range of sound intensities, about 1:1,000,000 - although the magnitudes are very small. A logarithmic scale is used to cope with this awkward range. This logarithmic scale, called the decibel (dB) scale, is named in honor of Alexander Graham Bell. Changes in sound energy proportional to 10, 100, and 1000 produce in the ear changes proportional to their logarithms, 1, 2, and 3, and if these are multiplied by 10 the sound energies are expressed in decibels. 0 dB corresponds roughly to the threshold of human hearing. (See Table A10, Page A-73.)

Community noise is generated by both distant and near sources and varies continuously. The distant sources may include traffic, wind in the trees, and industrial activities. These sources are fairly constant for short periods of time, but will vary from hour to hour and day to day as natural forces change. Nearby sources such as individual vehicle passages, aircraft flyovers, or train passages cause the environmental noise level to fluctuate from moment to moment.

When measuring community noise, two of the three acoustic parameters discussed above — frequency and intensity — are accounted for with a special filter on a sound level meter.

This filter, called the A-weighting filter, is needed since a person does not hear the entire frequency spectrum, but is limited to a range of about 20 to 20,000 Hz. Within this range the ear discriminates against the lower frequencies. The A-weighting filter electronically weights the amplitudes of the various frequencies approximately in accordance with a person's hearing sensitivity and sums these to obtain a single number, the A-weighted level. (4)

The A-weighting (dBA) has been available since the late 1930's and is one of the most accurate ratings for predicting loudness. (5) A-weighting is available on all U.S. and international sound level meters. B and C weighting filters are also available on sound measurement equipment. These filter networks have a different weighting spectrum than the A-weighting filter, are rarely used, and are not important for this report.

Table A 10
TYPICAL A-WEIGHTED SOUND LEVELS MEASURED IN THE ENVIRONMENT AND IN INDUSTRY (6)

	DECIBELS	
	140	
50 HP SIREN (100')		
	130	
JET TAKEOFF (200')		
	120	
RIVETING MACHINE	110	CASTING SHAKEOUT AREA
CUT OFF SAW PNEUMATIC PEEN HAMMER	100	ELECTRIC FURNACE AREA
TEXTILE WEAVING PLANT SUBWAY TRAIN (20')	90	BOILER ROOM PRINTING PRESS PLANT
PNEUMATIC DRILL (50')	80	TABULATING ROOM INSIDE SPORT CAR (50 MPH)
FREIGHT TRAIN (100') VACUUM CLEANER (10') SPEECH (1')	70	
	60	NEAR FREEWAY (AUTO TRAFFIC) LARGE STORE ACCOUNTING OFFICE
LARGE TRANSFORMER 200'	50	PRIVATE BUSINESS OFFICE LIGHT TRAFFIC (100') AVERAGE RESIDENCE
	40	MINIMUM LEVELS · RESIDENTIAL AREAS IN CHICAGO AT NIGHT
SOFT WHISPER (5')	30	STUDIO (SPEECH)
	20	STUDIO FOR SOUND PICTURES
	10	
THRESHOLD OF HEARING (YOUTHS) 1000 · 4000 Hz	0	

The A-weighted scale accurately describes environmental noise at a particular instant in time; however, community noise levels vary continuously, as previously mentioned.

B. Human Reaction to Environmental Noise

The effects of noise on people can be listed in three general categories:

1. Subjective effects of annoyance, nuisance, dissatisfaction;

2. Interference with activities such as speech, sleep, learning;

3. Physiological effects such as startle, hearing loss.

The sound levels associated with environmental noise, in almost every case, produce effects only in the first two categories. Unfortunately, there is no completely satisfactory measure of the subjective effects of noise, or of the corresponding reactions of annoyance or dissatisfaction. This is primarily because of the wide variation in individual thresholds of annoyance, and habituation to noise over differing individual past experience with noise.

It is difficult to assign a range of noise levels to each of the noise effects in the list above. Annoyance, nuisance, dissatisfaction, and startle effects can happen at virtually any level, and response depends on additional factors such as time duration, frequency content, background noise level, and the hearer's activity at the time. 70 dBA interferes with speech at a speaker-to-listener distance of 12 feet. (7) Long-term exposure to levels exceeding 70 dBA causes hearing loss. (8)

Through extensive study it has been determined that (9,10):

1. Except in carefully controlled laboratory experiments, an increase of only one dB in A-level cannot be perceived.

2. Outside of the laboratory, a three dB increase in A-level is considered a just-noticeable difference.

3. A change in A-level of at least 5 dB is required before any noticeable change in community response would be expected.

4. A ten dB increase in A-level is subjectively heard as a doubling in loudness, and would almost certainly cause an adverse change in community response.

About 10% of the population are so sensitive to noise that they object to any noise at all not of their own making. Thus, some complaints occur even in the quietest environments. Another sizable portion (about 25%) of the population, however, apparently does not react or complain even in very severe noise exposures. In any given noise exposure, therefore, a variety of reactions should be expected from the people exposed, ranging from serious annoyance to no awareness of a noise problem at all. Noise abatement efforts do not affect the reactions of the ultra-sensitive or the insensitive parts of the population; noise control helps only the middle 2/3 of the population. (10)

II. PRESENT NOISE ENVIRONMENT

Buonaccorsi and Associates measured noise in the Study Area on Monday, September 16, 1974 from 7:45 p.m. to 8:00 p.m. and on Tuesday, September 17, 1974 from 1:50 p.m. to 2:10 p.m. This data approximates the peak, average, and minimum noise level range in the existing environment. On-going construction and vehicular circulation is not representative of the noise environment in the near future. Therefore, extensive noise measurements of present conditions would not yield fruitful information for the purposes of this study.

During the daytime, traffic on streets adjoining the site and construction noise on Market Street control the environmental noise. The peak noise levels vary from 78 to 85 dBA due to truck, bus, and construction equipment passbys. 68 to 71 dBA was the average recorded noise level resulting from many sources over a wide area and is heard as a general roar of undifferentiated sound. Transportation noise is the major contributor to the average level. During lulls in the traffic, the recorded minimum noise level was 63 dBA.

During the evening the acoustical environment is quieter; noise from local traffic decreases and human activities reduce. Vehicles passing over the ventilation grating in Market Street adjacent to the site generate peak noise levels of 78 to 80 dBA. Aircraft flyovers, stop and go traffic, and Muni buses also contribute to the "peak" noise levels. The average evening noise level measured 50 dBA. Noise generated by distant traffic is more noticeable at night.

In discussing an area similar to the Study Area, the San Francisco Noise Element (11)stated,..."during the shutdown of the Municipal Railway in March 1974, Market Street in the vicinity of Leavenworth Street was approximately 10 decibels quieter than it ordinarily is! Based on sound level measurements, ten Muni diesel buses, streetcars, or cable cars per hour produce the noise equivalent of 700 passenger cars per hour".

III. NOISE IMPACT CRITERIA

Acoustic impact of the project is estimated by comparing the predicted noise levels during and after construction with the present noise environment. The degree of impact is divided into three categories; "no impact", "some impact", or "great impact", depending upon the amount by which the predicted noise levels exceed the existing noise levels. The impact categories are a measure of how annoyed the community will be with the new noise environment. The impact categories may be described in terms of anticipated reaction as shown in column 3 of the following table (12):

Table A11
NOISE IMPACT CRITERIA

Increase Over Present Noise Environment	Impact Category	Expected Community Responses
Less than 6 dBA	no impact	Rare expressions of dissatisfaction are expected.
6 -15 dBA	some impact	Some individual comment and reaction is expected, but no group action is likely.
Greater than 15dBA	great impact	Strong individual comment is expected, as well as the incipience of group action.

IV. NOISE IMPACT ASSESSMENT

The project will affect the surrounding noise environment in the following ways:

A. Construction equipment noise

B. Mechanical equipment noise

C. Parking Garage noise

D. Increase in vehicular traffic

The following discusses the above four conditions.

A. Construction

On September 17, 1974, Mr. Henry Barak of Continental Development Corporation (Developers of the subject project) informed us of the tentative construction schedule and equipment shown below:

Activity	Dates	Major Equipment
Demolition of existing structures & construction of barricades	12/1/74 (or as soon thereafter as feasible) for two months	-Boom Crane with headache ball -large loaders -dumptrucks
Excavation & Construction (Pile drivers will be used for approx. 45 days beginning 2 weeks after start of excavating, blasting is not expected)	2/1/75	-Pile drivers -large loaders -dumptrucks -boom & teller cranes
Completion	4/1/77	

Construction noise will cause short-time "great impact" lasting through completion of the project. Obviously, there are certain periods when noise levels are of less impact, e.g. during interior finish work; however, construction noise will generally be a source of speech interference and annoyance to workers in adjacent office buildings and pedestrians.

Depending upon the construction phase, we estimate that the noise level in the vicinity of the project will reach 80 to 90 dBA at least six to ten times an hour (Pile driving exceeds these estimates for both level and frequency of occurrence).

Initial demolition may not include the two-story restaurant (Figaro's). Construction of a two-story retail building may be delayed if the present tenant does not enter into an agreement with Continental before expiration of his present lease. Thus, construction impact may be extended until completion of the two-story retail building.

B. Mechanical

On September 13, 1974, Mr. Moe Dadci of Skidmore, Owings & Merrill (Architects & Engineers of the subject building) stated that all air intakes and exhausts for mechanical equipment will be provided with silencers so not to cause excessive mechanical equipment noise in the vicinity of the project.

C. Parking Garage

Mr. Arthur Goldman of Sedway/Cooke indicated that the present parking facilities at 36 - 40 Battery Street will be reduced from 221 to 209 parking spaces with the addition of three loading dock spaces. The normal occupancy of the parking garage is expected to increase from 80 to 90 percent. In our opinion, these changes in parking lot usage will have no impact on the surrounding environment. The increased use of the parking facilities and increased evening activity at the proposed restaurant in the project will cause "no impact".

D. Traffic

"Transportation noise is a function of both the number of vehicles and the noise output of the vehicles themselves. Barring unforeseen events, basic traffic patterns on San Francisco streets are not expected to change enough between now and 1995 to cause a perceptible change in the noise levels generated." (11) In our opinion the increase in vehicular traffic on Pine, Battery, Front, and Market Streets due to use of the proposed office building will cause "no impact". The reduction of noise on Market Street due to future elimination of streetcars will probably be offset by an increase in vehicular traffic volume upon completion of construction on Market Street.

V. MITIGATING MEASURES

A. Construction

All construction equipment should meet the regulations of the San Francisco Noise Abatement and Control Ordinance No. 274-72, Section 2907 Construction Equipment.

We expect the noise regulations will be made more stringent as time and technology progress; however, little can be done to reduce noise levels of construction equipment which is in good operating condition and fitted with high-performance mufflers in good condition. Thus, there will continue to be temporary impact of the environment due to construction equipment and activity.

We recommend intermittent noise control supervision of the construction process by the San Francisco Department of Public Works to assure that construction equipment noise is minimized.

B. Mechanical Equipment

As presently planned by the project architect, we recommend that all mechanical air intakes and exhausts be provided with lined duct and/or silencers where necessary so as not to increase the present ambient conditions. In addition, all mechanical equipment including chillers, cooling towers, fans, pumps, compressors, louvers, etc., should be treated so the surrounding acoustic environment will not be increased — a measure easily met by buildings of the type proposed. We recommend review of mechanical and electrical systems in the later phases of design to insure no increase in the present evening ambient conditions.

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APPENDIX E SOILS

Contents

This Appendix was prepared for Skidmore, Owings & Merrill by Dames & Moore, Consultants in The Environmental and Applied Earth Sciences, San Francisco, California.

1. EXISTING CONDITIONS

Soils

The ground surface is essentially level at very nearly Elevation 0, San Francisco City Datum.* Prior to the 1850's the general area of the project site was within San Francisco Bay. Between 1852 and 1856, a sea wall was constructed and the project site was reclaimed from the bay by earthfilling. Accordingly, the site (and nearby areas) is directly underlain by 20 to 25 feet of sandy fill placed during the 1850's.

Below the sandy fill material is approximately 15 feet of soft, compressible marine clay, locally termed Recent Bay Mud. The low strength and high compressibility of this stratum has dictated that foundation support for virtually all buildings in the site's neighborhood be supported on piles bearing in the next lower soil stratum.

The next lower stratum consists of approximately 20 to 30 feet of competent bearing sands (dense sands which provide good foundation support), silty sands, and clayey sands. These materials were probably laid down as beach deposits or alluvial (water-borne) deposits, at a time in the geologic past when sea level was lower than it is at present.

Beneath the above-described materials is approximately 100 feet of Old Bay Clay with intervening layers of sandy soils. These Old Bay Clay materials were probably deposited during the Pleistocene Epoch (about 2 million to 15,000 years ago) when the sea was as much as 300 feet below its present level. These materials are quite stiff.

The remaining soil materials consist of varying thicknesses (generally greater than 60 feet) of sands, silts, and clays which lie directly over Franciscan Bedrock (predominantly sedimentary rocks deposited 160 million to 80 million years ago). In this area the rocks of the Franciscan are chiefly graywacke sandstone and shale.

The depth of nonrock deposits above bedrock, in the profile described above, is in excess of 200 feet. The great depth of soil deposits overlying bedrock is a reflection of the fact that an ancient erosional bedrock canyon once existed along the general area of what is today Market Street.

Hydrology

Groundwater near the site in 1966 was at Elevation -9 (San Francisco City Datum). Measurements have not been recorded

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* San Francisco City Datum is 8.616 feet above Mean Sea Level.

recently, but at nearby locations the level in the sands below the Recent Bay Mud has been reduced to below -20 feet by dewatering of large construction projects between 1966 and 1970. It is likely that the level is now between -10 and -20 feet and may still be rising slowly. The quality of groundwater is not high enough for consideration as a potential economic source of potable water. Recharge of groundwater is negligible.

Surface water or ponding as a result of accumulation of rain water in low spots is infrequent because surface water generally drains from the paved areas and travels by the way of gutters to the sanitary storm sewer system. In some areas surface water may seep into the top layers of soil and remain above the impermeable layer of Recent Bay Mud.

Seismology

The major active faults nearest the site are the San Andreas, Hayward, Calaveras and San Gregorio Faults.* An active fault may be defined as one for which there is evidence of activity within recent geologic time and for which it is reasonable to expect possible activity during the lifetime of the proposed structure (about 100 years). The faults occur within the Coastal Range complex and generally have well-defined locations based on geomorphic features. Faults which are considered inactive by geologists have been mapped or inferred west and south of the site. These faults include the San Bruno Hillside and City College Faults. These faults are believed to be associated with the deformation of the Franciscan formation in Early Tertiary time (between about 80 and 2 million years ago).

Review of local geology maps and other pertinent publications has revealed no faults or shear zones near or projected through the immediate area of the site (see references). Shear zones indicate earth deformation, and therefore indicate the possibility of the presence of a nearby fault. There has been no evidence of surface faulting within several miles of the site.

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* The project site is about 8 miles from the San Andreas fault, 10 miles from the Hayward fault, 25 miles from the Calaveras fault and 13 miles from the San Gregorio fault.

II. IMPACT

Land Form Features

The proposed development will have no impact upon the land form features of the site or surrounding area. Presently-planned grading operations are within the site limits and except for basement excavations will consist of minor cuts and fills. The final site grading will require only minimal fill thickness to conform with the planned landscaping.

Erosion and Sedimentation

The proposed development will not have a significant effect upon the present erosion and sedimentation patterns of the immediate site area as the site is presently covered by pavements and buildings with runoff being carried through the municipal storm drain system.

Areal Settlement

The proposed site is in a "subsidence hazard area of artificial fill underlain by compressible Bay Muds," according to the San Francisco Seismic Safety Investigation performed by John A. Blume & Associates. Minor settlement may be presently occurring as a result of fill loads over the Recent Bay Mud. Basement excavation will relieve some of the fill loading, and building loads will be carried to deep supporting soils. The resulting effect on areal settlement is expected to be minor.

The present groundwater level is probably at or slightly above the depth of excavation, so dewatering will probably be minimal during construction. The resulting alteration in the groundwater level should be within the natural fluctuation levels of the existing groundwater table. In addition, the degree to which the groundwater level is lowered decreases rapidly with distance, so the potential effect of dewatering for this project on nearby buildings and utilities should be negligible.

Seismic Response

The site may be subjected to earthquake motion during the life of the proposed building. The foundation of the proposed structure will be designed to carry its load below the compressible Recent Bay Mud deposits to firm bearing materials, and the building will be structurally designed to resist the damaging effects of earthquake motion. It is unlikely that the present seismic reponse characteristics of the site will be altered significantly since soil-structure interaction effects have been shown to be small for structures of the type proposed.

Excavations will be made for the proposed basement construction. Accordingly, shoring of excavation slopes will be required to minimize or prevent displacement of earth into the excavation. Basement walls will be designed to resist permanent lateral loading from the adjacent soil.

The proposed site is within an "area of liquefaction potential" according to the San Francisco Seismic Safety Investigation performed by John A. Blume & Associates. Potential for liquefaction of the bearing sand layer during a major earthquake is small because of its density. The potential for partial liquefaction of the upper sand fill will be considered in the foundation design of the building.

Water Quality

The proposed project is expected to have a negligible effect upon the groundwater regime in the site vicinity. The present groundwater level is probably at slightly above the depth of excavation, so drawdown adjacent to the structure should be minimal. The proposed development will have a minor effect on the groundwater movement throughout the site.

Wastewater will be discharged into the city sewer system. Connections will be designed to meet City Building Code requirements. If minor contamination of the groundwater were to occur due to utility line leakage, the impact upon the environment would be negligible; the groundwater supply at the site is brackish due to its proximity to the present bay shoreline. It is the opinion of Dames & Moore that the groundwater occurring in the vicinity of the proposed development is not a potential economic source of potable water.

Runoff and Drainage

The proposed project development will not have an adverse impact upon the present site runoff and drainage characteristics. At present, the exisiting buildings and asphalt and concrete surface coverings allow only very minor infiltration of the rainwater into the groundwater. All of the runoff water is collected and transferred from the site area via the combined sanitary-storm drain system located in the adjacent streets. This condition will continue.

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